NOVEMBER 1954

PRECISION METAL MOLDING

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS
INVESTMENT CASTINGS
POWDER METALLURGY
PERMANENT MOLD CASTINGS
PLASTER MOLD CASTINGS
SHELL MOLDINGS

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Zamak ZINC BASE DIE CASTING ALLOYS

Whatever aluminum or zinc alloy you use, you're always assured of trouble-free production and quality castings. Quality of metal is always uniform; rigid metallurgical control and latest testing devices assure that every pound meets your specifications. Each order, large or small, receives prompt individual attention. Each order is palletized for easy handling and is shipped with a certified chemical analysis.

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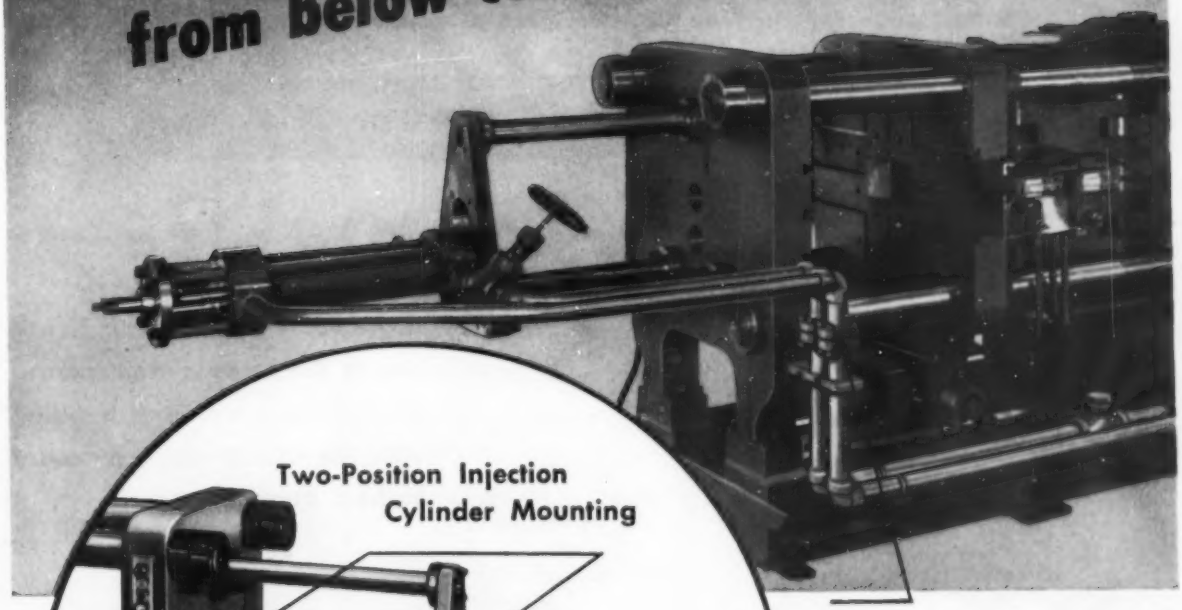
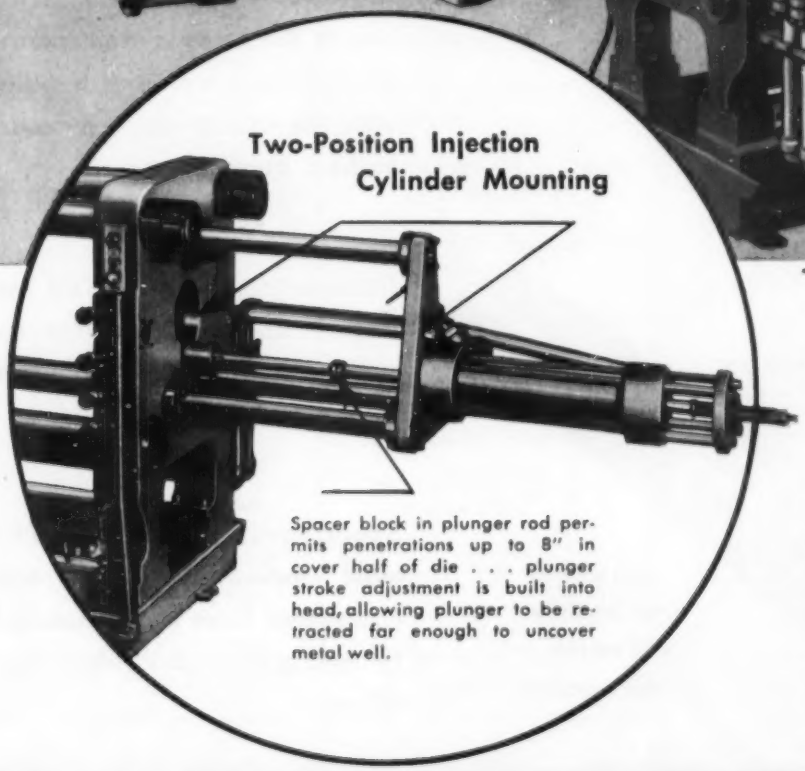
Another CAST-MASTER BONUS feature

FAST, EFFICIENT CHANGE-OVER from below center to center shot!



Two-Position Injection Cylinder Mounting



Spacer block in plunger rod permits penetrations up to 8" in cover half of die . . . plunger stroke adjustment is built into head, allowing plunger to be retracted far enough to uncover metal well.

When changing from below center to center shot, simple addition of extra section of pipe eliminates the use of hose or flexible tubing, thereby affording an extra measure of safety.

In modern production, time means money. That's why leading die casters praise the exclusive features shown here, which permit rapid change-over without sacrificing safety. To learn about other Cast-Master "bonus" features, send for the new, complete catalog giving illustrations and specifications on eight great new models.

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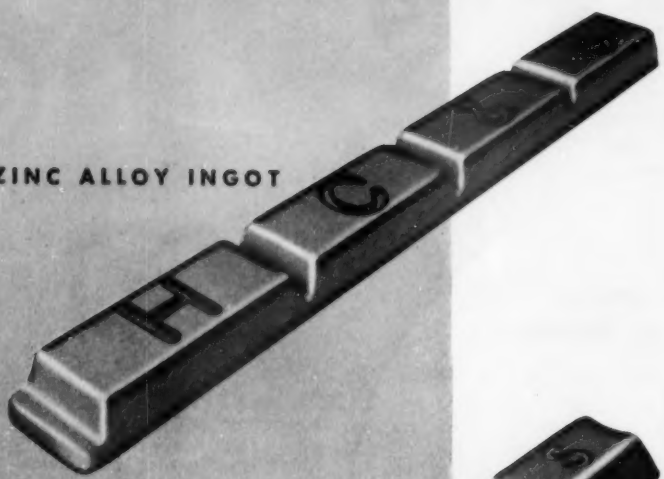

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ALUMINUM ALLOY INGOT

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Uniformity of Alloys. You can depend upon the consistent and uniform quality of our alloys at all times.

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NOVEMBER, 1954
Volume 12 Number 11

PRECISION METAL MOLDING

DIE CASTINGS • INVESTMENT CASTINGS • PLASTER MOLD CASTINGS
PERMANENT MOLD CASTINGS • POWDER METALLURGY • SHELL MOLDINGS

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FEATURE ARTICLES

39 HOW MANY POUNDS OF ZINC DIE CASTINGS GO INTO TODAY'S CARS?

42 WHICH BERYLLIUM COPPER ALLOY FOR YOUR CASTING? A review of properties of three casting alloys.

44 CASTINGS IN PLASTER MOLDS PAY OFF for development work or full-scale production.

46 FLEXIBLE COUPLINGS DESIGNED TO RESIST SHOCK LOADS IN SHEAR. Die castings meet all requirements.

48 HIGH STRENGTH STEEL PARTS produced by new powder metallurgy process.

53 ODD SHAPES CAN BE EASY SHAPES. Peculiar geometry of aircraft parts can be investment cast.

55 POSITIVE REGISTER BETWEEN HINGED COMPONENTS . . . obtained by die casting.

96 MELTING AND CASTING POINTERS for better aluminum die castings.

FINISHING SECTION

59 FROM DIE CAVITY TO PLATED AUTO TRIM. The story of a die casting.

65 THREE WAYS TO USE ULTRASONIC SOLDERING ON ALUMINUM DIE CASTINGS.

REGULAR DEPARTMENTS

6 Letters to the Editor
13 Between the Lines
16 Reference Data
27 Changes in Personnel
68 Product Facts
71 New Products
79 Industry News
93 Simplified Solutions
102 Opportunities

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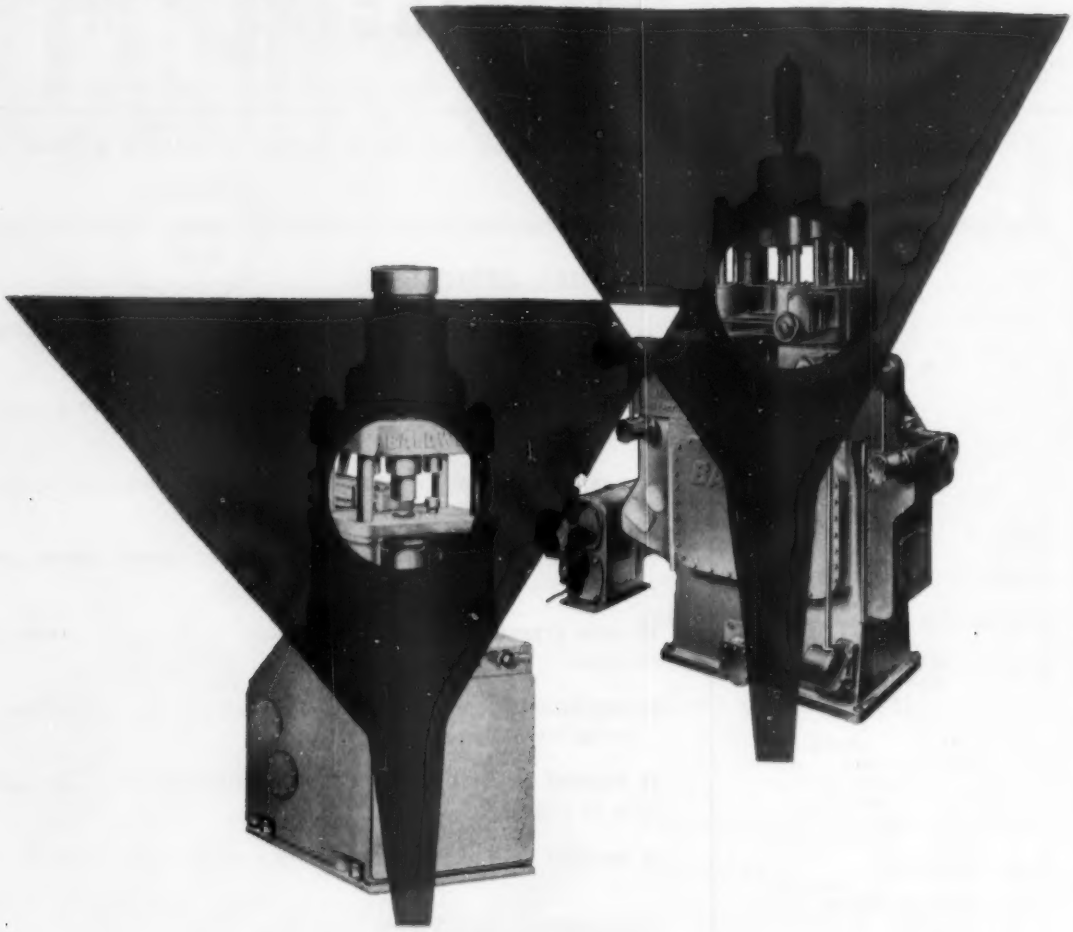
PRECISE FILLING OF DIES *by new Baldwin powdered metal presses makes compacts more uniform . . .*



THEIR highly efficient shuttle type feeders enable Baldwin's new Model "L" and Model "C" powdered metal presses to compact parts much more uniformly. Air operated and cam controlled, this unique feeder moves from under a stationary hopper to a position over the die. It carries the same volume of material over the die cavity each time with a very smooth motion.

This shuttle is supported on guide rods with a spring loaded cutoff ring which prevents loss of material. Cleanline design of the feeder eliminates those recesses or projections that might keep the powder from filling the die cavity completely.

This is just one of the ways you'll benefit by specifying Baldwin Model "L" (50-ton) or Model "C" (100-ton) presses to meet the growing demand for powdered metal parts. These new presses are the very first designed specifically for use in compacting metal powders. Both feature sealed mechanisms, hydraulic heads, special fill adjustments, automatic lubrication and variable cycling.

For our new bulletins on "L" and "C" please write promptly to our Dept. 4756, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.

BALDWIN-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities

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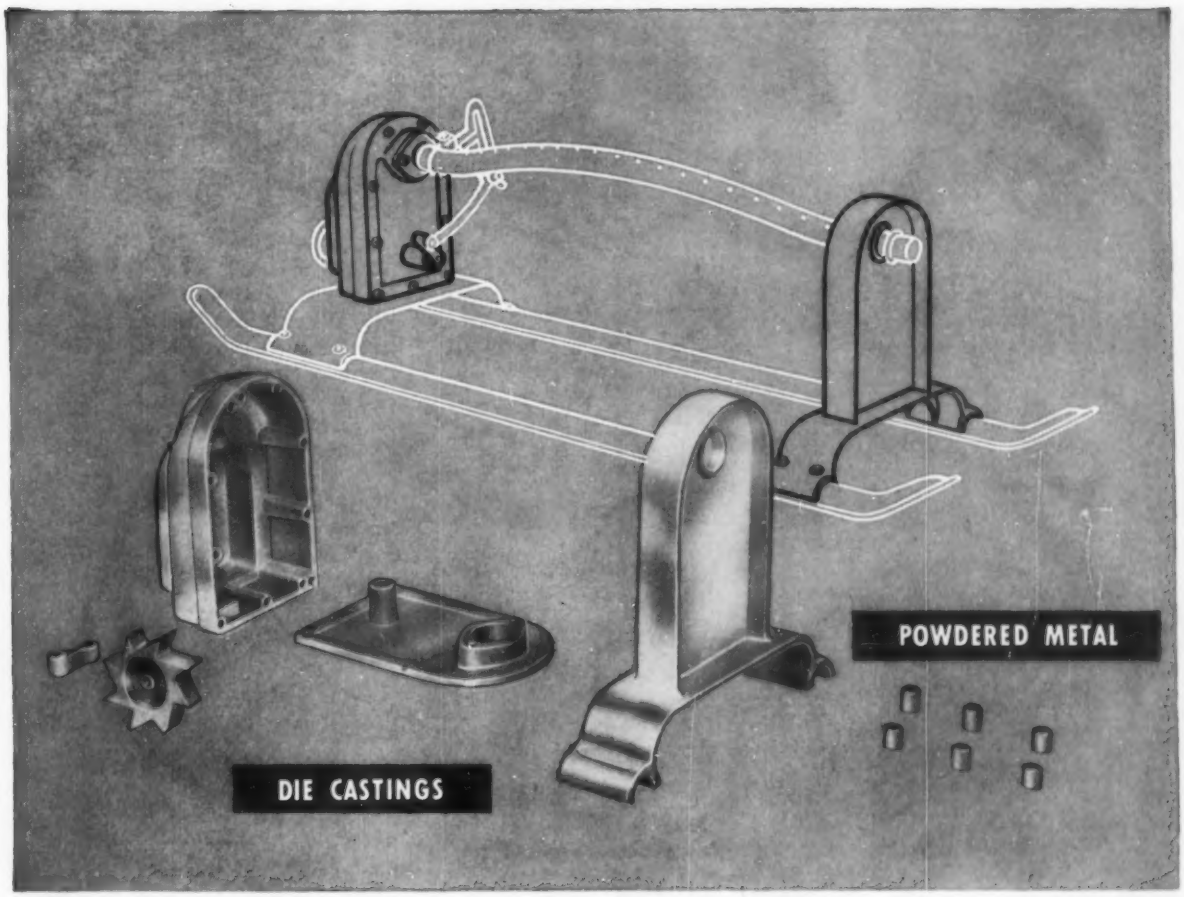

PARKER USES 2 MEANS TO 1 *Lower Cost* END

Low cost—consistent with high quality—was the primary objective in producing important component parts for the popular lawn sprinkler made by Eastern Machine Products Inc. Parker gained this objective by making the end bracket, actuator housing, crank, and water wheel of aluminum die castings. The bushings inside the housing are bronze alloy sintered metal. The end result: component parts that meet every specification at lower cost.

This example emphasizes an important point about Parker service. No matter what your requirements in either die castings or powdered metal, Parker has the skill, experience and facilities to provide either or both. This undivided responsibility has saved money—and solved problems—for many users. Your problem may be one that Parker can solve in like manner. Just call the nearest Parker sales engineer listed at the left.

Parker White Metal Company • 2153 McKinley Ave., Erie, Pa.

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DETROIT 35, Mich.
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PARKER ALUMINUM and ZINC *die castings*

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with the HYDRIMET ALLOYS

For high-quality, high-physical powder parts, the Hydrimet alloys eliminate waste and reduce production costs. Metal Hydrides' Titanium and Zirconium metal powders and pre-alloyed powders of Tantalum, Titanium, Zirconium, Nickel, Chromium, Cobalt or Columbium assure desired results. These powders are moldable, uniform, and finely divided assuring homogeneous parts regardless of their size.

Your inquiry will bring you complete information about the Hydrimet products without obligation.

M H

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INCORPORATED

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Letters to the editor

LOW MELTING CASTINGS

We are interested in obtaining information on precision casting of low-melting alloys such as Cerrotru and Cerrocast. The articles are quite complex; they should have a dimensional tolerance of plus or minus 0.0015-0.002 inches per inch and have a good surface finish. We will require small quantities (10-100) of many different patterns.

We are considering methods such as plaster casting or other investment type of casting due to the small quantity of each pattern. We have also considered the possibility of single cavity permanent molds, and even composite permanent molds for the more complex shapes.

We would appreciate your comments on these casting methods, as to the precision that might be expected, the facilities that would be required and the relative costs of each method.—P.A.W. (Assistant Manager, Purchases)

Tolerance quoted are closer than can normally be met by the various casting methods. Usual commercial tolerances are ±0.0005 per inch, and while individual dimensions are sometimes held closer than this, it is not safe to assume that this can be done without consultation with the jobbing caster. In most cases, these dimensions would require finished machining. Location of the dimension will determine the degree of accuracy, but it is not possible to generalize upon the feasibility of such accuracy.

Tooling cost for investment casting and plaster mold casting is quite low, and while many jobbing foundries will not quote on the small quantities you require, there are others who make a specialty of this type of work. Names of several have been forwarded.

Continued on page 8

Die Casting

enables **1** maker to use the same **2** parts for **3** different tools

CASE HISTORIES FROM MT. VERNON FILES

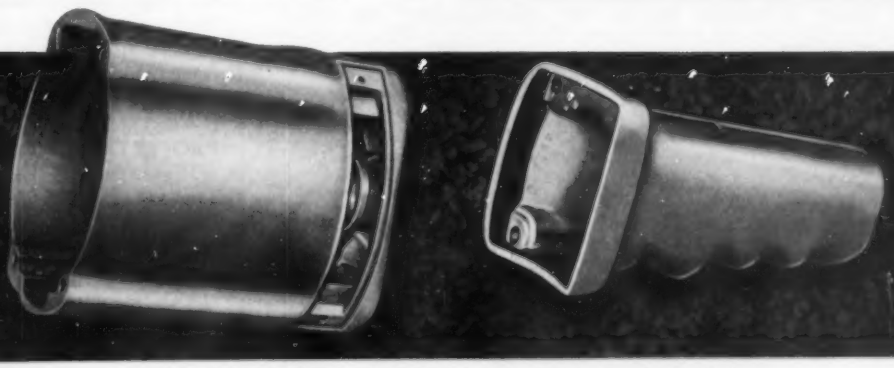
While we have introduced the economies of die casting to manufacturers in many fields, it strikes us that Millers Falls Co., Greenfield, Mass., comes closer than most to gaining the *maximum* benefits from making die cast parts interchangeable.

Among the varied line of quality electric tools they make are the three units shown above: (A) The No. 404 Portable Electric Grinder; (B) The No. 270 Polisher; (C) The No. 870 Industrial Sander. In each of these tools two identical Mt. Vernon die cast parts serve as motor housing and handle. The two parts are fastened together at different angles—but think of the savings in labor, savings in time, savings in inventory!

Other advantages inherent in these die-cast parts are light weight combined with strength to withstand the vibration and pounding these tools receive—also, even with intricate designs such as these, die casting is done to such close tolerances that machining is minimized.

Whatever *your* product, you can almost certainly profit by considering the advantages of die casting: light weight, simplicity, lower costs. Our varied experience of many years is wholly at your service. Let us know your needs today.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT



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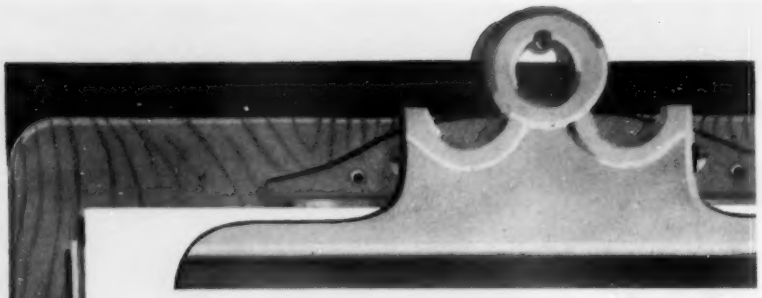

MEMO TO: DESIGN ENGINEERS
SUBJECT: SHELL MOLDING

Design people working with the stainless alloys are faced with the problem of determining whether or not the shell mold process can be utilized to advantage for the products on their boards. We certainly don't claim to know all the answers but when it comes to experience, our Shell Mold Division has had such a long lead on the field that we're in a much better position than most to examine a rough sketch and tell you with a high degree of accuracy if shell molding is feasible.

These advantages have already been proved on the production line:

1. Better surface finish
2. Closer tolerances
3. Reduced machining costs
4. Greater uniformity & reproducibility
5. Greater legibility of markings
6. Sounder castings in thinner sections
7. Faster deliveries

Why not send us a sketch of the stainless steel casting now on your boards, or in use in a product you've designed. Without obligation we'll have our shell mold engineers look it over and send you their opinions as to its adaptability to shell molding.

COOPER ALLOY
THE COOPER ALLOY FOUNDRY CO. • HILLSIDE, N. J.
Los Angeles San Francisco Oakland Houston Chicago Detroit Philadelphia Hartford
Leading producers of STAINLESS STEEL valves, fittings and castings

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LETTERS TO THE EDITOR
continued from page 6

Probably the greatest element of cost would be the initial tooling. For investment casting, a mold from which wax patterns could be made would be needed. For plaster mold, a brass pattern plus special core boxes would be needed. Permanent mold or die casting necessitate a steel mold and would be most expensive. Whether or not any of these tooling costs can be justified depends upon the amount of machining and assembling they would save, as compared with conventional machining and assembling techniques using bar stock.

Few companies have commercial experience casting these low melting alloys, although some have cast lead successfully, and the majority of investment casters have used the Cerro alloys or other low melting materials in making molds. We have suggested a list of sources who may be able to meet your requirements.—Ed.

SINTERED COPPER RINGS

We need the names of some companies who can make 4" diameter sintered-copper rings impregnated with Teflon, polyethylene or other plastics.—A.F.H. (Defense Research Div.)

Names of companies known to press equipment large enough to produce these rings, have been forwarded. Whether or not they can perform the desired impregnation is not known, but if not, it may be possible to have a custom impregnating firm do that part of the job. Names of impregnators have also been forwarded.—Ed.

INVESTMENT CASTING PROPERTIES

Please forward reprints of Part 1 and Part 2 of the article entitled, "The Influence of Metal Structure on Properties of Investment Castings", by Dr. Nicholas J. Grant. A.M.T. (Technical Director).

Tear sheets sent.—Ed.

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QED . . . more safety and more savings are pumped into hydraulic equipment when CELLULUBE 150 is the fluid.

Celanese

announces the new

HIGHER-SAFETY, HIGH-SAVINGS FIRE-RESISTANT HYDRAULIC FLUID

CELLULUBE* 150

Here's how surely CELLULUBE 150 tends to eliminate your line-break fire hazard.

We've poured it over molten liquid baths. Result: merely intermittent flicker of flame which would not support combustion.

We've atomized CELLULUBE 150 onto hot metal flame-heated to approximately twice the temperature at which petroleum based fluids spontaneously ignite. There was no ignition with CELLULUBE 150.

In addition to providing such outstanding fire resistance, CELLULUBE 150 assures excellent lubrication . . . is non-corrosive, non-reactive, chemically stable, long-lasting . . . contains no additives . . . has a high boiling point (approx. 790° F.) . . . requires minimum fluid maintenance . . . is competitively priced.

Let us help you pump more safety and savings into your hydraulic equipment. We can start right away by sending you technical data . . . and supplying answers to your specific hydraulic fluid problems. Your request will get prompt attention.

Celanese Corporation of America,
Chemical Division, Dept. 589-K.
180 Madison Avenue, New York 16, N. Y.

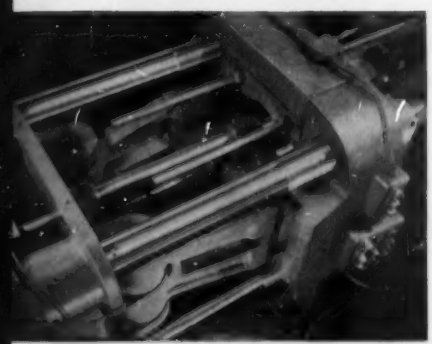
Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

Revolutionary New Answer

Leading die casters are enjoying the highest quality and the lowest costs ever. Illustration shows a battery of LAKE ERIE machines in a plant of The ELECTRIC AUTO-LITE COMPANY.

More than 100 of these Revolutionary Lake Erie Machines have gone into service in less than 2 years



The "Wedge Cam Toggle" is an exclusive Lake Erie Engineering design.

"WEDGE CAM TOGGLE" The revolutionary Lake Erie "Wedge Cam Toggle" has provided a new standard of comparison for increased die casting production. This self-compensating toggle clamp automatically takes up clearances in the dies due to contraction and expansion of the molds during production or shut-down periods, and, at the same time, engages and disengages easily without binding. This is accomplished by the use of a circular cam contact surface together with rolls which guide the toggles during engagement and disengagement. The toggle action is actuated by a hydraulic cylinder which provides smooth, rapid opening and closing.

"PRESSURE PAC" This patented unit consists of automatic pressure booster in the hydraulic circuit between the accumulator and the injection cylinder. It provides the necessary pressure to feed the shrink or compress the porosity at the time of solidification of the metal. The standard unit is arranged for 2-to-1 pressure increase. Special units are available for higher pressure ratios.

For more information circle No. 47 on the Reader Service Card

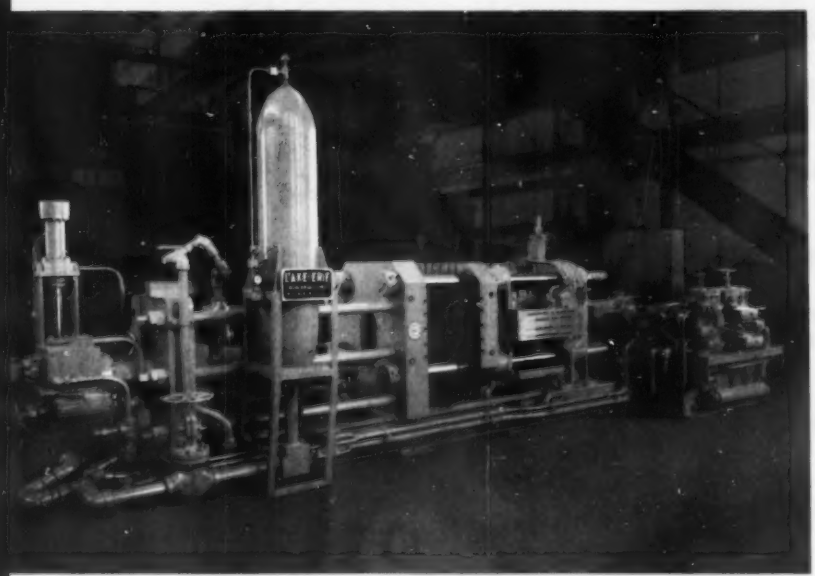
To Die Casting Problems

by LAKE ERIE ENGINEERING CORP. BUFFALO, N.Y. U.S.A.

... these new die casting machines have increased production 15% to 25%

Lake Erie's patented "Wedge Cam Toggle" and "Pressure Pac" injection unit provide the industry with the first major improvements in die casting machines in many years. In addition to these two *exclusive* contributions to improved production, Lake Erie Die Casting Machines incorporate a number of other engineering advancements—all of which combine to give you die casting equipment which through its increased earning power makes other machines obsolete.

These industry-proven Lake Erie Die Casting Machines are available in 10 models, ranging from 100 to 1000 ton capacity and for casting all the usual nonferrous metals and alloys.



With all shrouding removed the clean, sturdy construction of Lake Erie Die Casting Machines is self-evident. All parts easily accessible. Model shown is standard AH-60P cold chamber machine rated 600 tons.

OPERATING FEATURES

- **Patented "Wedge Cam Toggle"**
  Self-compensating adjustment for heat expansion.
  Increased hourly production due to positive clamping pressure during each machine cycle.
- **Patented "Pressure Pac"**
  Feeds the shrink or compresses porosity during solidification of aluminum, magnesium and brass.
  Irons out the skin surface gas lines. Provides denser castings.

Simplified maintenance of all elements including manifold valve block. Faster job set-up. "Jack Screw" pedestal mounting of the injection cylinder facilitates faster change-over from high or low positions of the injection sleeve. Pushbutton control. Automatic continuous cycle or a single cycle operation available. Hydraulic core pulls may be operated on four sides of the platen. Electrical interlock with core-pulls prevents die jam.

Write for this Catalog

Illustrations, specifications, application data—all are here in complete detail with full explanation of the patented "Wedge Cam Toggle" and "Pressure Pac" production advantages.

LAKE ERIE ENGINEERING CORP.

General Offices and Plant

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for Quality Production

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99.99+% SLAB ZINC

A reliable source for die casting requirements

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Between the Lines of this and future issues

IN AUTOS . . . HOW MANY ZINC DIE CASTINGS?

Most auto builders report that the number of zinc die castings in 1954 models is equal to or greater than those used in 1953. Those who are willing to comment on 1955 models at the time this magazine went to press were optimistic about continued applications of zinc die castings at present levels. PMM reports in this issue on automotive zinc die castings.

TWO WAYS TO USE PLASTER MOLD CASTINGS . . .

A leading manufacturer of hydraulic equipment finds that plaster mold castings in brass and bronze save money in two ways: as a replacement of sand castings and as prototype components for product development. The story appears on page 44.

GOOD SHOP PRACTICE FOR MELTING ALUMINUM . . .

From an authority in the field, we have obtained an outline of some good shop practices to follow in melting aluminum for die casting. See page 96.

NEW TRENDS IN POWDER METALLURGY . . .

Few metal fabricating techniques have had as many new developments and have expanded their range of usefulness, as rapidly as powder metallurgy has done. New uses for powdered metals and new ways of obtaining improved properties are constantly being introduced. PMM has made a consistent attempt not only to illustrate the best in successful application of powdered metal parts to product design, but also to keep our readers posted on new developments in this fast-growing field. One such new development is a new technique for obtaining components that compete with wrought stock in physical properties and costs. For a report, see page 48.

HOW TO USE BERYLLIUM COPPER CASTINGS . . .

Beryllium copper has some unique properties, such as its aging and fluidity characteristics, that make it well suited for certain types of castings. A full report on the alloy to use for investment castings and pressure castings starts on page 42.

COMING UP SOON . . .

Some of the articles to appear in the next few issues of PMM include: a report on powdered metal parts and investment castings used in diesel engines; a detailed comparison of permanent mold vs semi-permanent mold castings; precision casting of titanium under vacuum; how die castings help in the manufacture of vending machines; what can be accomplished by vacuum die casting of aluminum bronze; and many other important articles.

PRECISION INVESTMENT CASTING

Small, intricate parts that formerly required costly machining or assembly time can now be produced economically, accurately, and to a high finish, by Precision Investment Casting. Parts with undercuts, cores, and holes, are a "natural" for this precision process.

This modern casting technique offers increased production, lower manufacturing costs, and a greater freedom in the development of new parts.

SEND FOR THE INVESTMENT CASTING STORY

Write for free 12-page booklet – "MODERN PRECISION INVESTMENT CASTING" – the most complete source of facts and data available today.

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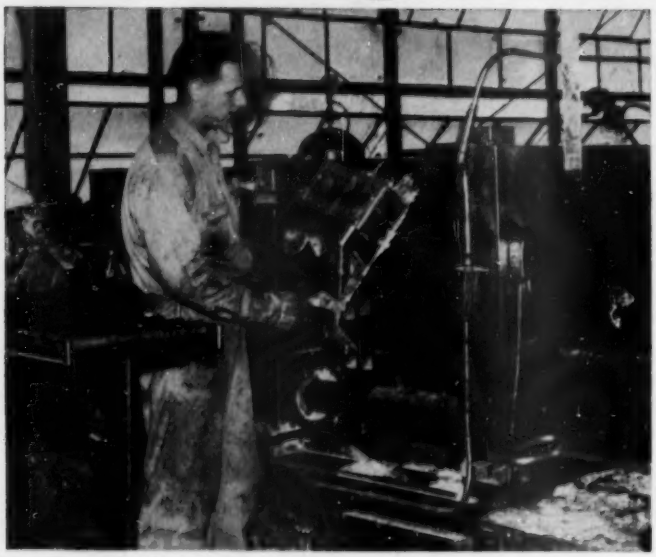
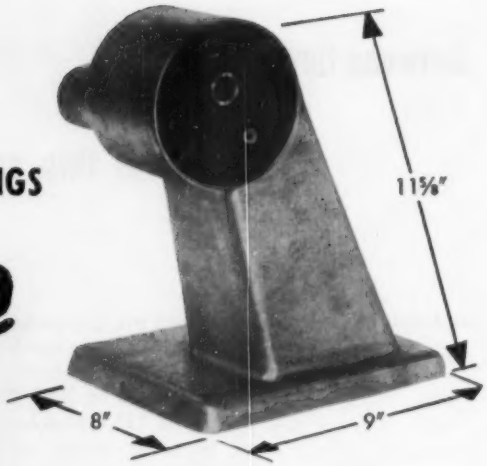
PEMCO

PRODUCES ALUMINUM DIE CASTINGS

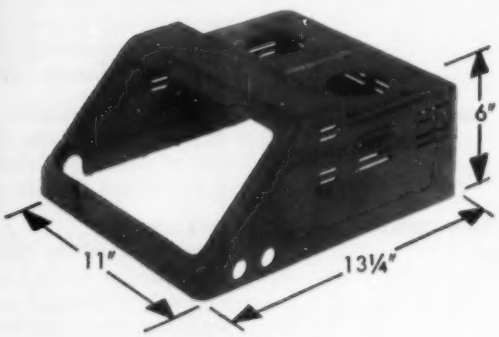
king size





8¼ LB. SHOT

Roll drive housing for electric ironer. Produced for Bendix Home Appliance Co., South Bend, Ind. Finished casting weight is 6.9 lbs.



4¼ LB. SHOT

Tape recorder housing cast for Permoflux Corp., Chicago, Ill. Photo at left shows operator removing the as-cast housing from the Cleveland Model 400 Die Casting Machine. Finished casting weight is 3 lbs.

WITH CLEVELAND MODEL 400 DIE CASTING MACHINES

The two castings shown above are typical of the top quality output of Product Engineering and Manufacturing Corp., Bridgman, Michigan. And like many other leading die casters, the mainstay of PEMCO's casting production are Cleveland Model 400 Die Casting Machines.

With the Cleveland Model 400's tremendous die locking pressure, high-speed shot injection, and rapid die closing and opening action, PEMCO receives a continuous flow of dense, hardware finish castings at a highly profitable rate of production.

Let Cleveland's time-proved leadership in die casting machine design give your die casting department or shop the same dependable performance—on zinc and aluminum castings—large and small—simple and complex. Ask a Cleveland sales engineer to show you the many Cleveland Model 400 advantages. For information on machine design details and specifications, write for Bulletin 400.

Remember: *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4952 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
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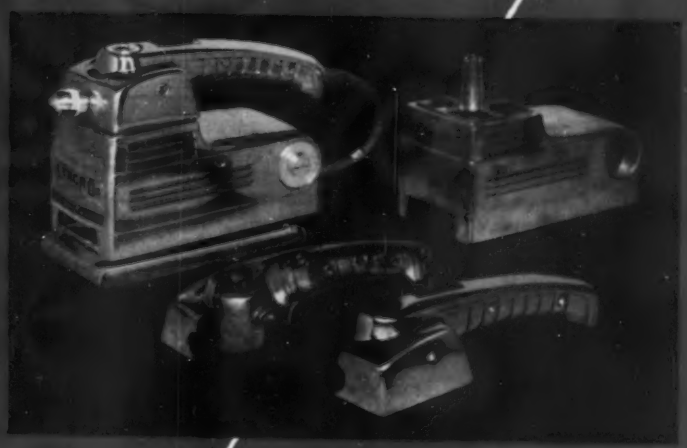
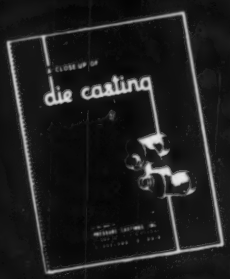
Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

For more information circle No. 22 on the Reader Service Card





This booklet brings our organization to you, in words and pictures. Write for your copy today!

Electric Appliances? Yes, for home and shop, die castings by Pressure are an important part of many of the country's leading products..... such as the housing and handle of this new portable sander!

PRESSURE CASTINGS, INC.

die castings

ZINC AND ALUMINUM ALLOYS

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Monroe 5392

Manufacturers Sales
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Hebron 3-6902

For more information circle No. 66 on the Reader Service Card

Reference Data offered in this month's advertisements

1. DIE CASTING MACHINES for high speed production of small parts in zinc, lead and tin are described in Bulletin A-10 from the A. B. C. Die Casting Machine Co.

3. DIE LUBRICANTS of the dry film type are fully described in reprint DC and Bulletin No. 426-G on molybdenum disulfide and graphite lubricants. Both are available from Acheson Colloids Co.

4. INDUCTION MELTING of small quantities of any metal can be economically done with converter operated furnaces. Bulletin No. 14 published by Ajax Electrothermic Corp. gives full details.

8. ALUMINUM BASE die casting alloys are described, their chemical and physical properties given in a bulletin on Z-39 die casting alloy, published by Apex Smelting Co.

9. DESIGNING INVESTMENT CASTINGS and the proper alloy selection are thoroughly discussed in a booklet published by Arwood Precision Casting Corp.

12. USEFUL DESIGN data on die castings is offered to engineers and buyers of die castings by Allen-Stevens Corp. This is a basic reference guide for users and prospective users of this type of casting.

15. METAL POWDER PRESSES incorporating several advanced features and combining both hydraulic and mechanical actions are described in bulletins issued by Baldwin-Lima-Hamilton Corp.

17. ALLOYS FOR INVESTMENT casting are described and their chemistry and as-cast properties given in the new MasterMet bulletin issued by Cannon-Muskegon.

18. DIE CASTING MACHINES featuring fast change over from zinc to aluminum are described in the new catalog from Cast-Master, Inc.

19. NON-FLAMMABLE hydraulic fluids are fully described and their properties given in the technical data availab'e from the Celanese Corp. of America.

21. INJECTION MACHINES for wax or plastic patterns in the investment casting industry are described in Bulletin No. 1202 from the Centrifugal Casting Supply Co.

22. HIGH SPEED PRODUCTION of dense die castings is discussed in Bulletin No. 400 giving design details and specifications of die casting machines from Cleveland Automatic Machine Co.

29. DIE CASTINGS of all types and sizes are described in bulletins from the Dollin Corp.

30. ALLOYS FOR INVESTMENT casting, prices, specifications, chemistry and applications are available from Charles Dreifus Co.

35. TINY DIE CAST PARTS are described in a bulletin from Gries Reproducer Corp.

37. THE HENNING MESSENGER, a monthly house organ of Henning Bros. & Smith, gives information on die casting applications, as well as plant news.

38. INVESTMENT CASTING, its advantages and economies are described in a free booklet, "Investment for Economy . . . for Performance," published by Hitchiner Mfg. Co., Inc.

To get copies of any item listed here, simply circle the appropriate number on the Reader Service Card bound into this issue.

40. DIE CASTING MACHINES, both cold chamber and gooseneck types, are described in Bulletin No. 5400 from the Hydraulic Press Mfg. Co.

44. ELECTROLYTIC IRON powder and how it can improve products is told in a book'et on HVA Electrolytic Iron Powder, distributed by A. Johnson & Co., Inc.

49. DIE CASTING MACHINES built by Lewis Welding & Engineering Corp. are fully described and their complete specifications given in Bulletin 103.

50. CASTING MACHINES and melting furnaces are all described in literature availab'e from Lindberg Engineering Co.

51. DESIGNING DIE CASTINGS is the subject of literature that is available from Litemetal Dicast, Inc.

53. PERMANENT MOLD castings in aluminum are described in a brochure from Mansfield Brass & Aluminum Corp.

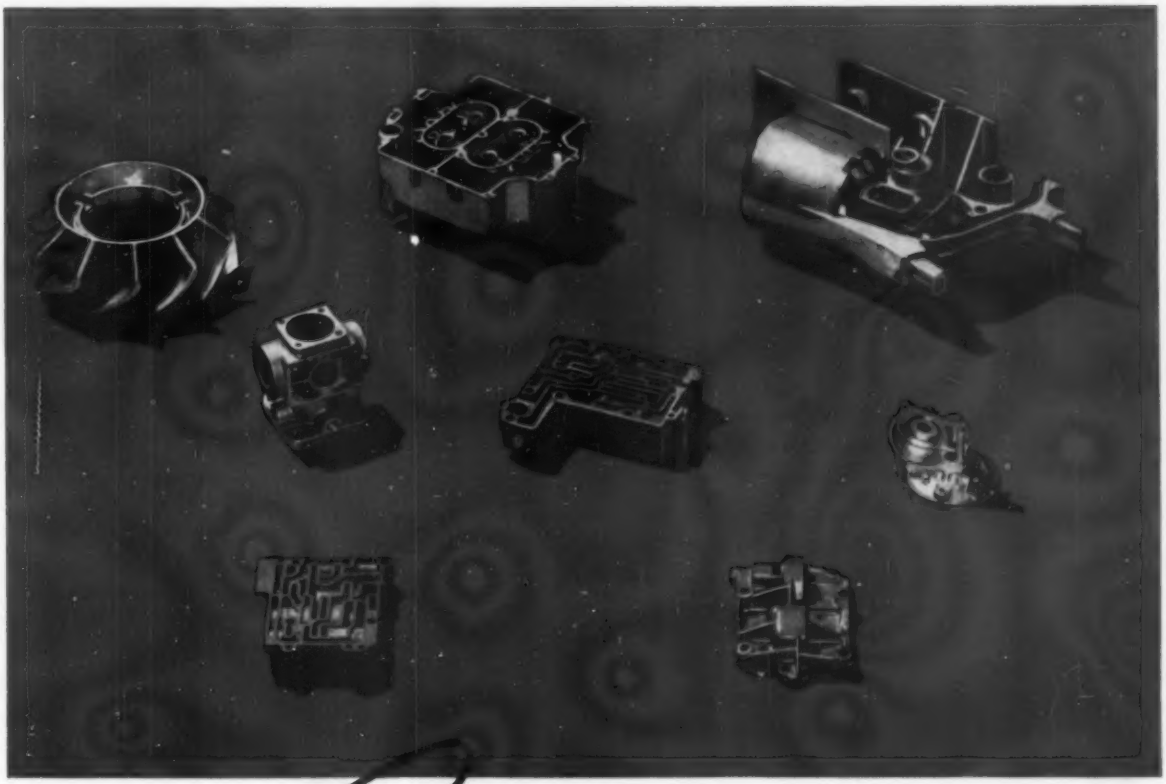
54. ALLOYS BY THE HYDRIMET process are described and their chemical and physical properties given in technical data from Metal Hydrides, Inc.

56. FROM DRAWING TO finished product is described in Monarch Aluminum Mfg. Co.'s descriptive fact file on their Unified Production Formula.

59. FIRE RESISTANT HYDRAULIC fluid for hazardous hydraulic applications is described in the Monsanto Chemical Co. booklet on Pydraul F-9.

60. IRON POWDER PARTS made from electrolytic iron are described and the advantages of this type of powder given in bulletins from the Plastic Metals

Continued on page 19



Intricate
DIE CASTINGS

PRECISION Die Castings offer you substantial savings in the production of intricate or complicated component parts. Precision has *demonstrated* ability to produce castings from the simplest to the most complex involving intricate dies and coring methods.

You benefit many ways—

1. Your subsequent machinery operations are eliminated or reduced.
2. Often several parts can be combined in one casting.
3. Considerably reduces your cost.

Write for Complete Information TODAY!

PRECISION CASTINGS CO., Inc.
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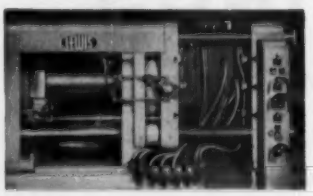
British Affiliation — Wolverhampton Die Casting Co., Wolverhampton, England

For more information circle No. 65 on the Reader Service Card

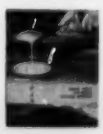
Listen to the newest heartbeat of the die-casting industry

The LEWIS 650-B die-forge casting machine is setting new standards for the industry! It has no equal for the economical mass-production of high-strength aluminum and magnesium alloy parts.

Key to the superiority of the LEWIS 650-B is the powerful two-stage injection system used in conjunction with the exclusive "HYDRA-LOCK" clamping mechanism. Hydraulic injection plunger fills dies rapidly, and then molten metal is forged with final squeeze pressures up to 100,000 pounds. These tremendous pressures are possible because of the "HYDRA-LOCK" mechanism, which exerts a 650-ton hydraulic clamping pressure to keep dies closed and prevent "spitting." It also permits quicker die setting and compensates for moderate misalignment of die faces.



"HYDRA-LOCK" clamp in closed position. A sliding block automatically moves into position behind strut to assure full locking pressures for clamping mechanism.



WRITE FOR BULLETIN 103 FOR DETAILS AND SPECIFICATIONS

To stay competitive in today's market, specify the LEWIS 650-B die-forge casting machine.

4033-I.W

LEWIS

THE LEWIS WELDING AND ENGINEERING CORPORATION
63 INTERSTATE STREET — BEDFORD, OHIO

For more information circle No. 49 on the Reader Service Card

REFERENCE DATA
continued from page 16

Div. of The National Radiator Co.

68. DIE CASTINGS to specification is the subject of a report on the facilities of the Racine Die Casting Corp.

69. ALUMINUM DIE CASTING machines, featuring high speed and high pressures are described in catalog No. 1154 from the Reed-Prentice Corp.

71. INVESTMENT CASTING facts and data are presented in a 12-page booklet from Alexander Saunders & Co.

76. NON-FERROUS MELTING furnaces of all types and sizes are described in a complete catalog from Stroman Furnace & Engineering Co.

77. SILICA FOR INVESTMENT casting in all sizes and types is described and prices given in literature from Tamms Industries.

79. INJECTION MOLDING MACHINES for making plastic patterns for investment castings are fully described in data from the Van Dorn Iron Works Co.

80. BARREL FINISHING with improved barrels and specially designed burnishing shapes is described in literature from Abbott Ball Co.

82. BARREL FINISHING COMPOUNDS for economical and consistent results are described and applications given in data from Almco Supersheen.

83. SELENIUM RECTIFIERS for all plating needs are discussed in a detailed brochure from Bart-Messing Corp.

85. MODERN PLATING procedures and results are given in a booklet published by the Four Plating Co.

86. THREADED INSERTS, their applications and advantages are given in a brochure from Groov-Pin Corp.

Continued on page 78

For more information circle No. 21 on the Reader Service Card

ALL NEW! THE FIRST COMPLETELY AUTOMATIC INDUSTRIAL INJECTOR FOR WAX OR PLASTICS

ASSURES INCREASED PRODUCTION

Injecting at pressures up to 1500 PSI the new "3C" INDUSTRIAL INJECTOR cuts production cost of wax patterns through more accurate and speedier operation.

Complete Cycle—clamping, injecting & release of mold requires just the flip of a switch.

Injects up to 2½ lbs. of material in one cycle.

Thermostatic controls insure correct, uniform temperatures at all times.

Large capacity tank holds up to 75 pounds of wax or plastic.

Write today for Bulletin #1202

"EVERYTHING FOR CASTING"

CCS CENTRIFUGAL CASTING SUPPLY CO.
147 WEST 42nd STREET • NEW YORK 36, N.Y.

Take A Tip From An Oil Burner Manufacturer

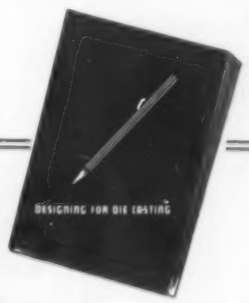
". . . up against a competitive market for your product? Looking for a way to cut costs while improving the quality of your product?

"We had the same problem in manufacturing oil burners. For example, the turbulator that guides the movement of air is a bladed component that would be too expensive by welding, too rough by sand casting and too weak by plastic molding.

"To get a strong, smooth, accurate component at low cost, we turned to die casting.

"The key to our success has been the jobbing die caster who produces the castings. We have found that Allen-Stevens Corp. has the experienced engineers, the modern die casting equipment, and the cooperative management who were able to meet our needs exactly."

If your problem concerns a metal component, talk it over with Allen-Stevens engineers, or send prints for quotation.



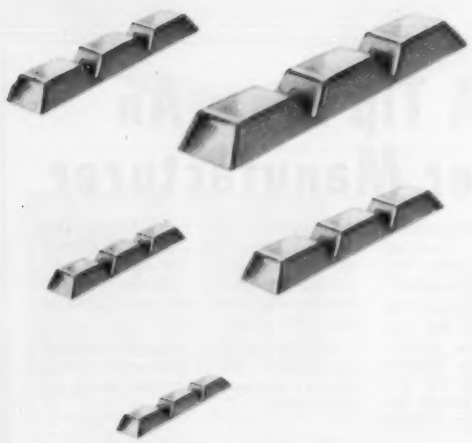
DIE CASTING MANUAL prepared to help in designing or buying is yours for the asking, if you are concerned with the specification or purchase of die castings.

ALLEN-STEVENS Corporation
62nd St. at 34th Ave. • Woodside 77, New York

For more information circle No. 12 on the Reader Service Card

For over 40 years serving Foundrymen First!

ALUMINUM ALLOYS ASSURE CONTINUED



Only the Aluminum Smelting Industry can be relied upon, unfailingly, for

the alloys you need
the variations you want
the quantities you wish
the deliveries you require
the services you should expect
the prompt attention you must have

no foundry ever shut down because

FROM SMELTERS FOUNDRY GROWTH

All these come only as a matter of course from a supplier who looks upon you as his major customer—from the Aluminum Smelting Industry which for over 40 years has proved to be the one constant, reliable source of aluminum alloys for FOUNDRIES.

Today's comfortable overall supply of aluminum does not, in itself, guarantee that foundries' needs for aluminum alloys will remain readily available as a result.

Immense tonnages of aluminum will be consumed in the presently expanding wrought products mills now under way to provide for the increasing requirements for fabricated shapes in the construction, transportation, automotive, communication, and other fields.

The increased aluminum production will insure supplies for those rapidly increasing wrought product applications, *but it will not assure the foundry its future aluminum alloy ingot supply.*

For over 40 years supplying foundry alloys has been the Aluminum Smelters major effort—it will continue so in the future.

* * * *

Like to know why the Smelting Industry is uniquely qualified to serve you? A recent article in "Modern Metals" discusses the history and background of the smelting industry—it is a frank discussion of the reasons for a feast and famine aluminum supply. Write for a free copy.

ingot was not available from smelters!

Aluminum Smelters Research Institute
20 North Wacker Drive, Chicago 6, Illinois

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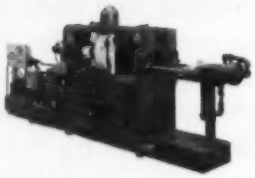
most aluminum die castings can be made on the low-cost

LESTER HP-1-C?



The group of aluminum die castings shown here ranges in overall size from a modest 7" x 4-3/4" to a respectable 11" x 8-5/8". The comparable range of weight is 9-1/2 ounces to 1 pound 12-3/4 ounces. A conservative estimate is that this range includes about 80% of all aluminum die castings being made today.

The average die caster would probably schedule these castings on a 400 ton machine. *Yet every single one of the castings shown was run on the Lester-Phoenix HP-1-C, rated at 200 tons of clamping!* Just think of the savings in machine-hour-costs that are effected by casting such parts on the comparatively inexpensive HP-1-C.

A vital part of the success of the HP-1-C is the one-piece alloy steel frame, perfectly and permanently aligned. This assures an *effective* clamping pressure of well over the rated tonnage.

Sid Wills, Shop Superintendent at Johnson Motors where most of these castings are being run on five HP-1-C's, says "We like the HP-1-C's. They're rugged, fast and easy to maintain." Write for complete specifications. IMMEDIATE DELIVERY.

LESTER-PHOENIX DIE CASTING MACHINES

REPRESENTATIVES

New York	Steven F. Kroudl	Seattle	Perine Machinery & Supply Co., Inc.
Detroit	M. R. Tenenbaum	Cincinnati	Index Machinery Corp.
Chicago	J. J. Schmidt	Los Angeles	Seaboard Machinery Co.
Cleveland	Don Williams	San Francisco	J. Fraser Rae
Coral Gables	Morton Machinery Sales	St. Louis, Milwaukee	A. B. Geers

FOREIGN

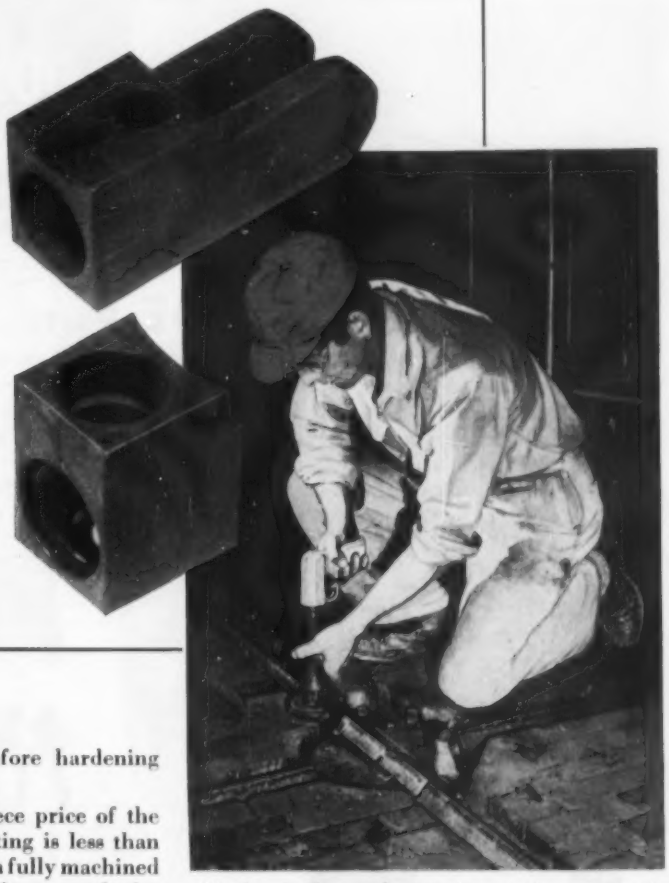
Toronto, Canada	Modern Tool Works, Ltd.
Sydney, Australia	Scott & Holladay, Ltd.
Japan	Okura & Co., New York, Inc.
Stockholm, Sweden	Aktiebolaget Servus
Basle, Switzerland	Hermann Walti

distributed by LESTER-PHOENIX, INC., 2708-F CHURCH AVENUE • CLEVELAND 13, OHIO

For more information circle No. 48 on the Reader Service Card

Produced for half the cost of machining

by Inco Precision Casting



He shoots the works. The Ramset fastening tool saves time and money on difficult fastening jobs, like setting studs into concrete, through wood into steel. Powder-actuated, it actually *shoots* any of a variety of fasteners into the construction materials without any special preparation.

There are, in fact, 68 fastener types and sizes offered by Ramset. One line is made of Inco's Duranickel® for strength, hardness and corrosion-resistance. These are used in storage tank lining and dam construction.

The cost of these two parts seemed high to Ramset's designers when they began estimating the cost of machining them from bar stock.

Inco proved it *was* high — plenty high. The proof? When the parts are precision investment cast by Inco, RAMSET GETS EACH PART FOR HALF THE COST of machining them from bar stock.

Save on Machining

The trouble was *they're small parts.* They would take too much complicated machining, many too many operations and set-ups.

To nail it down exactly, machining this cube-like safety release bracket for Ramset's powder-actuated fastening tool would take eight operations and four set-ups. The other part, a hinge bracket, would take *twelve operations and eight set-ups.* Both were to be made in 1020 steel.

Look at the contrast when they are precision cast by Inco:

The hinge bracket needs only two simple machining operations and the safety release needs none before hardening and finishing.

"The per piece price of the investment casting is less than half the cost of a fully machined piece when both are ready for hardening and surface finishing."

And Ramset is just one of many. If you want to see how others cut costs with Inco Precision Castings, write for a free copy of "A Machinist's Nightmare Becomes a Designer's Dream."

Can You Cut Costs with Inco Precision Castings? Whenever you have a part which is 6 inches x 5 inches or smaller, weighs under 3 lbs., requires starting tolerances as close as plus or minus .005 inch per linear inch, and needs 5 or more fabrication steps, there's a good chance you can save by having it precision cast.

What Alloys can be Precision Cast? You may obtain precision castings from Inco in practically any metal with a high melting point—from plain carbon steel to the new super alloys. And no matter what metal you specify, you get many advantages.

5 Advantages of Inco Precision Castings:

Lower fabricating costs
Wider design latitude
High alloys at lower cost
Longer life with harder alloys
Eliminates all or most machining.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

Inco Castings PRECISION, SAND, CENTRIFUGAL

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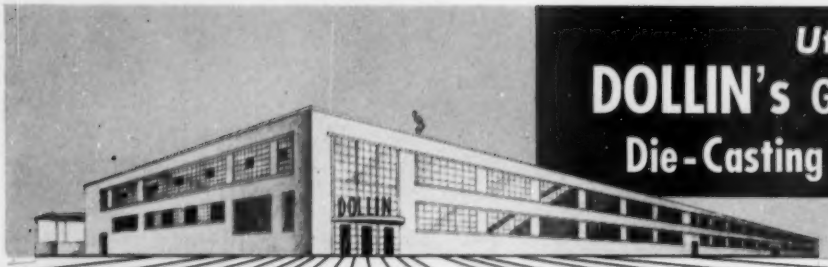
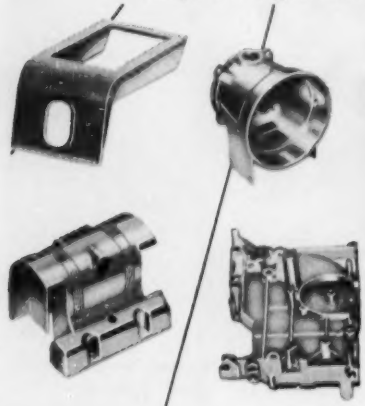


Utilize

DOLLIN's Greatly Expanded Die-Casting Facilities to...

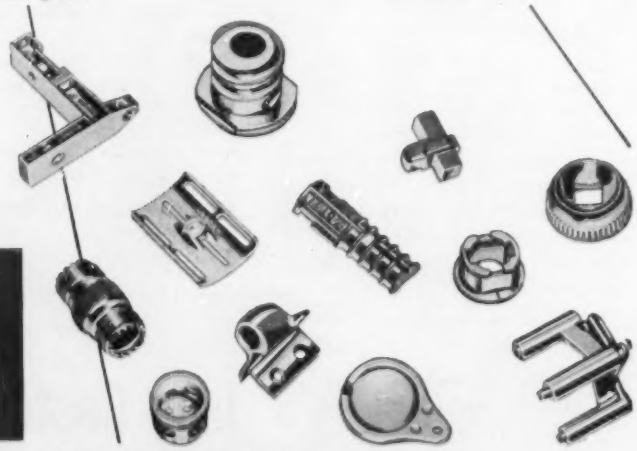
Cut Costs of LARGE Parts . . .

Many leading manufacturers have long depended on our specialized experience and equipment for their zinc and aluminum die-casting needs. Now all departments—aluminum castings, large zinc castings, small zinc castings—have been *doubled* in capacity *and* made more efficient. Let us show you what this can mean to you in piece-costs . . . casting quality . . . deliveries. Send prints or samples for quotation—engineering advice at no obligation.



Cut Costs of SMALL Parts ...

Would you like to buy an *assembly* instead of 2 or 3 separate small parts? Eliminate machining operations? Cut scrap loss? Perhaps you can with *low cost* small zinc die-castings (1000 per lb. to 3 per lb.) made at screw-machine, stamping press speeds on our special *fully-automatic machines*. Send prints or samples for quotation—write for *Small Parts Folder & Samples*.



DOLLIN Zinc & Aluminum DIE-CASTINGS

Dollin Corporation 614 So. 21st St., Irvington 11, N. J.

Sales Offices: Boston • Buffalo • Canton • Charlotte • Chicago • Detroit
Louisville • Philadelphia • Pittsburgh • St. Louis • St. Paul

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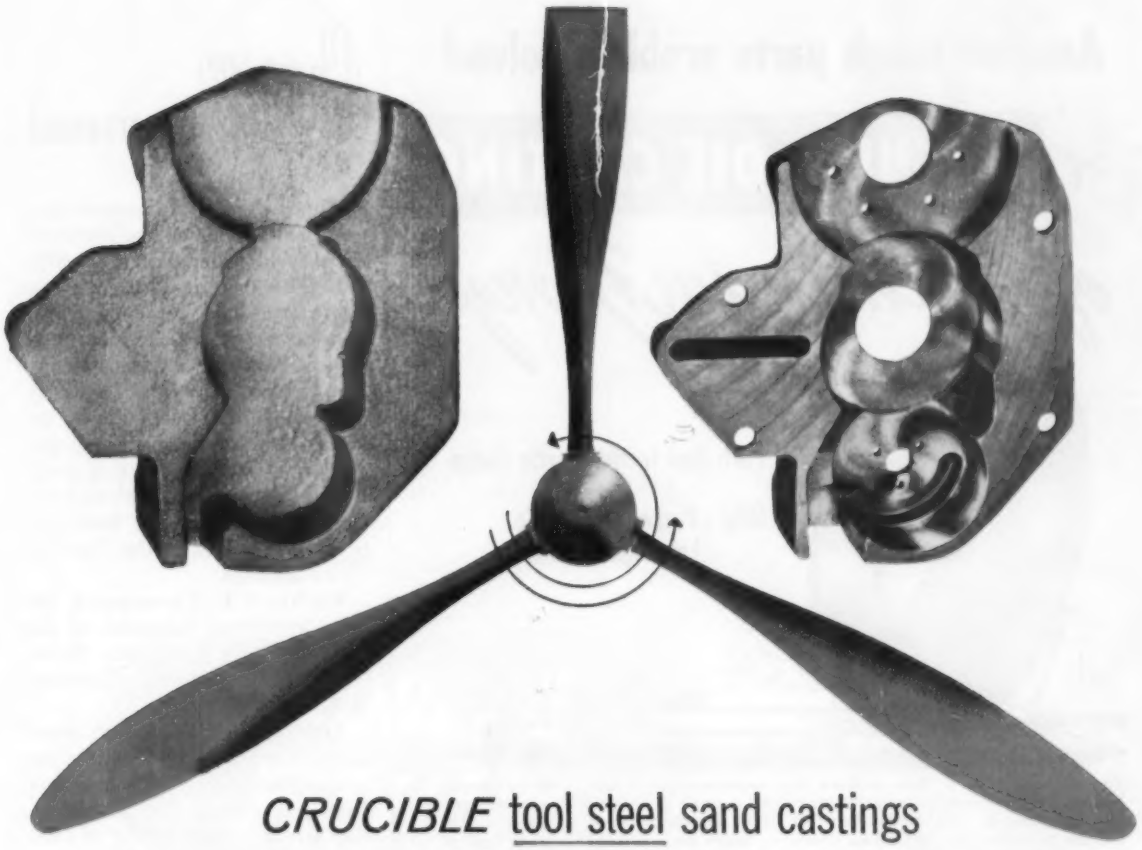


CRUCIBLE tool steel sand castings

end frequent replacement of aircraft propeller pump parts...

This AIRKOOL tool steel sand casting, a sump pump housing for an aircraft feathering propeller, adds valuable flying time between overhauls.

Originally made of magnesium, the housing wore down and had to be replaced frequently. Crucible castings engineers tackled the problem. Their solution: AIRKOOL castings of 5% carbon, air hardening tool steel. AIRKOOL's abrasion resistance, toughness, machinability, and nondeforming qualities when hardened, make it practical to cast to close tolerances. And although the walls of this part are sometimes less than ⅛" thick, it's heat treated to 55Rc with no discernable distortion.

Refer *your* production problems to Crucible. For Crucible castings engineers have both the *experience* and *production facilities* for quality castings – sand, investment, shell mold, green or baked core. When you need steel castings *call Crucible.*

CRUCIBLE first name in special purpose steels

54 *years of* Fine *steelmaking*

AIRKOOL SAND CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL • SPECIAL PURPOSE STEELS

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

For more information circle No. 24 on the Reader Service Card

Another tough parts problem solved

by VACUUM DIE CASTING

of Aluminum Bronze

Part: Fast fueling nozzle flange

Mfgr.: Parker Aircraft Co., Los Angeles, Calif.

The aircraft industry, both military and commercial, had long required faster fueling. Parker Aircraft Company engineered a single point pressure fueling system for filling at rates better than 600 GPM. However, the flange fixed to the aircraft to receive the nozzle had created a "tough parts problem" . . . it had to be precision fitting, high tensile strength yet tough, relatively light, wear and corrosion resistant, non-sparking and leak proof under surge pressures of 180 psi.

The exclusive Vacuum Die Casting process developed by the Aurora Metal Company and an AUR-O-MET aluminum bronze alloy met and surpassed all of these requirements.

METALLURGICAL ADVANTAGES

The AUR-O-MET aluminum bronze alloy provided the important non-sparking requirement. It also resists corrosion from both fuel and weather, increasing part life. The added density provided by the vacuum process further resists wear caused by continued locking and unlocking of the nozzle.

ENGINEERING ADVANTAGES

Higher tensile, freedom from porosity, structural uniformity and greater density provided by the vacuum method enables locking lugs to support the weight of the hose assembly, and prevent leakage under the 180 psi pressure surges. Thinner sections for weight reduction are possible without sacrificing strength.

COST SAVING ADVANTAGES

The as-cast precision tolerances obtained by the vacuum method reduced the amount of subsequent machining operations. Further savings were effected because the vacuum die castings are free of oxide inclusions, reducing machining time and tool wear.

If you have a "tough parts problem," vacuum die casting of aluminum bronze may be your answer.

Vacuum die casting of aluminum bronze is not a cure-all, but it has proved to be the answer for a wide range of parts-production problems.

Our engineering staff's extensive experience is at your disposal. If you have a specific problem, send prints or specifications . . . we will give them our prompt attention.

Learn more about vacuum die casting in aluminum bronze. Send today for this free informative brochure.

AUR-O-MET ALLOYS

Aurora Metal Company

DEPARTMENT W AURORA, ILLINOIS

Representatives in: New York City, Rochester, Cleveland, Cincinnati, Detroit, Grand Rapids, Chicago, Minneapolis, Los Angeles, Boston, Seattle.

For more information circle No. 10 on the Reader Service Card

Changes in personnel

Three personnel changes have been announced at the Norwood Works of *Allis-Chalmers Mfg.* Co. **Thomas C. Knudsen** has been appointed assistant to the general manager in charge of the mechanical product development laboratory. **Vernon B. Honsinger** has been named assistant to the general manager in charge of the electrical product development laboratory. **Dwight H. Lory** has been appointed manager of the *Texrope Drive Section.*

Richard J. Thompson has been appointed salesman of the Alkyd Resin Products Sales, *General Electric Co.* Chemical Materials Dept.

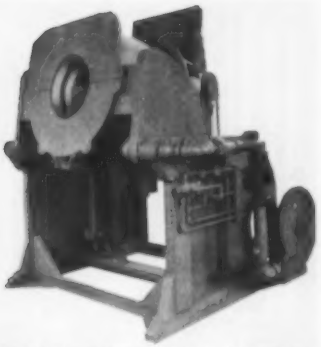
Arthur P. Schulze has been appointed manager of public relations and advertising for *Diamond Alkali Co.* **Oscar E. Kuhlman,** former editor of Diamond's Painesville Plant employee publication has been promoted to assistant manager of public relations and advertising in the company.

Robert Lee Weidman has been appointed as technical sales representative for *The Cooper Alloy Co.* Weidman will cover the mid-Atlantic States.

Wm. K. Duff & Co. has recently been appointed as field representative in the New England territory and **Joseph L. Glaser** in the mid-Atlantic area for the *Chromalloy Corp.* of New York.

The Norton Co. has announced a number of changes in field personnel. **Charles M. Wellons** has been made abrasives engineer in the Philadelphia territory; **Robert C. Divoll** is the new abrasives engineer in the Pittsburgh territory; **Chas. R. Garfield** is a new field engineer in the Pittsburgh territory; **Wm. J. Mahan** is field engineer for Abrasive Grain applications in New England (except Connecticut); and **Joseph**

Continued on page 30



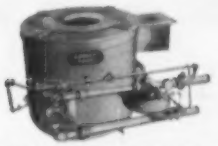
Lindberg-Fisher type HNP Hydraulic Nose-Pour Tilting Crucible Furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 57-A.

For Permanent Mold Castings

A complete line of

LINDBERG FISHER

ALUMINUM MELTING and HOLDING FURNACES

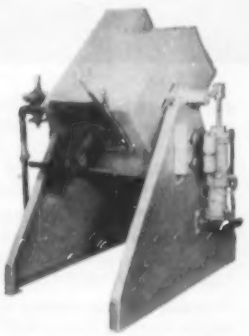


Lindberg-Fisher type ADC Aluminum Melting and Holding Furnace. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 301.

Lindberg-Fisher Electric Resistance Aluminum Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities up to 1000 lbs. of aluminum.

Lindberg-Fisher manufactures all types of Aluminum Melting and Holding Furnaces for permanent mold application—Gas-Oil-Electric resistance.

Lindberg-Fisher engineers can intelligently recommend the type of furnace to best suit your needs and conditions.



Lindberg-Wessel Casting Machine produces quality aluminum castings on a semi-automatic basis using either graphite or steel molds which are attached to the machine. Described in Bulletin LW.

Melting specialists for 25 years
Sales and service offices in principal cities

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The Timken Company Protects $500,000 Furnace With—

FIRE-RESISTANT PYDRAUL

First tunnel-type furnace for billet heating uses 1,000 gallons of Monsanto fire-safe hydraulic fluid

50 tons of steel per hour is the capacity of this furnace. Safe Pydraul actuates 3 hydraulic operations: billet-charging machine, car separators and car lifts. Non-corrosive Pydraul can be re-used again and again, cuts oil make-up 60%.

Pydraul: Reg. U. S. Pat. Off.

Near heat or flame, ordinary hydraulic fluid is a serious hazard. Spraying from a line break, it can ignite to cause injuries, loss of production, costly equipment shutdowns.

That's why The Timken Company insisted on Pydraul in this new heat-treating furnace at Canton, Ohio, built by Swindell-Dressler.

Pydraul will not sustain flame. In tests, when sprayed into a 6000°F. oxyacetylene flame, it does not support combustion. At Timken the furnace temperature may go to 2300°F. Heat that would set ordinary fluid aflame does not ignite Pydraul.

Since industrial fires give no warning before they start, check the hydraulic fluid now used in your plant. Is it fire-resistant? If not, let us tell you about Pydraul . . . a recent price reduction makes it more than ever the most economical fire-resistant fluid in actual use. For information, call any Monsanto office.

This report, "Pydraul F-9," will be sent on request. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, Box 478, St. Louis, Missouri.

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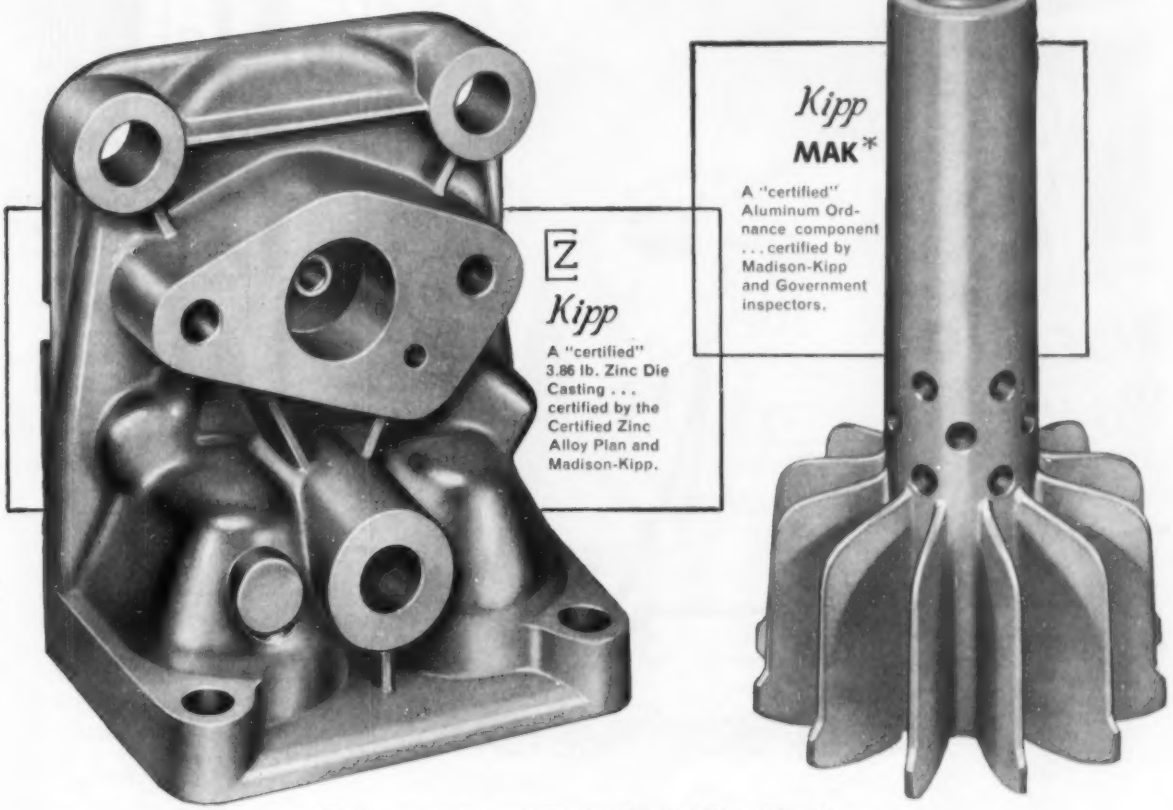
MADISON-KIPP OFFERS

A TIME TESTED FORMULA IN DIE CASTING METALLURGY



Kipp **Z**

A "certified" 3.86 lb. Zinc Die Casting . . . certified by the Certified Zinc Alloy Plan and Madison-Kipp.

Kipp **MAK***

A "certified" Aluminum Ordnance component . . . certified by Madison-Kipp and Government inspectors.

We belong to the authoritative Certified Zinc Alloy Plan of the American Die Casting Institute. We take similar precautions in Aluminum. The degree of adherence to these effective certified controls, plus the degree of good housekeeping, equals the degree of perfection that can be reached in die casting metallurgy from an operational standpoint.

Good housekeeping has kept the mountains of metal we have used to the exact original certified specifications. We have not been off-grade on any casting whether for Ordnance or commercial use, ever.

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*Official designation on Ordnance components.

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● Skilled in Die Casting Mechanics ● Experienced in Lubrication Engineering ● Originators of Really High Speed Air Tools

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Want a dependable source of supply?

USERS OF pig, ingot and billet can rely on Kaiser Aluminum as a dependable source of supply because we are an integrated producer.

We produce pig, ingot and billet to all standard specifications or to special customer specifications.

In addition, Kaiser Aluminum gives faster service and delivery on orders from our conveniently located plants at Newark, Ohio; Chalmette, Louisiana; Halethorpe, Maryland; Mead and Tacoma, Washington.

Our outstanding engineering service includes design assistance and other technical advice. For prompt personal service, contact the Kaiser Aluminum sales office listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office:* Palmolive Bldg., Chicago 11, Illinois. *Executive Office:* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

The nation's largest supplier of pig, ingot and billet

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CHANGES IN PERSONNEL

continued from page 27

F. Hartl is sales engineer for abrasive grain in the state of Connecticut.

W. Paul Moorhead has been named as sales engineer for the New England States by *Aurora Metal Co.*

Richard D. Town has been appointed pigment sales supervisor in the middle Atlantic States for the *Metals Disintegrating Co.*

New appointments and promotions announced by *Kobe, Inc.* are: **W. F. Slater** as general sales manager; **R. G. Ralph** as hydraulic service manager; **Ray Elner** as hydraulic sales manager; and **J. T. Lewis** as southern division sales manager.

R. W. Powell has been appointed general sales manager of the machinery division of *Hydraulic Press Mfg. Co.*

Robert L. Bell, formerly superintendent of metals for Carboloy Dept., *General Electric Co.* has been appointed manager of manufacturing engineering.

Dr. R. C. Gibson has been promoted to the position of assistant Vice President of *Parker Rust Proof Co.* At the same time the company announced the promotion of **E. W. Richards** to Technical Director and **R. I. Peterson** to the position of Service Manager.

L. R. (Larry) Farrell of Cleveland has joined the *High Frequency Div. of Lindberg Engineering Co.* of Chicago to specialize in motor generator induction heating sales.

Heber L. Newell has been named assistant general manager by *The Denison Engineering Co.* He was formerly general manager of the *Barrett-Cravens Co.*

Dr. Kenneth C. D. Hickman, formerly vice president in charge of research of *Distillation Products Industries,* has been appointed research consultant to the *Consolidated Vacuum Corp.* of Rochester.

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Customer styling services by COL. ALEXIS DE SAKHNOFFSKY

Die casting, stamping, plating and finishing facilities.

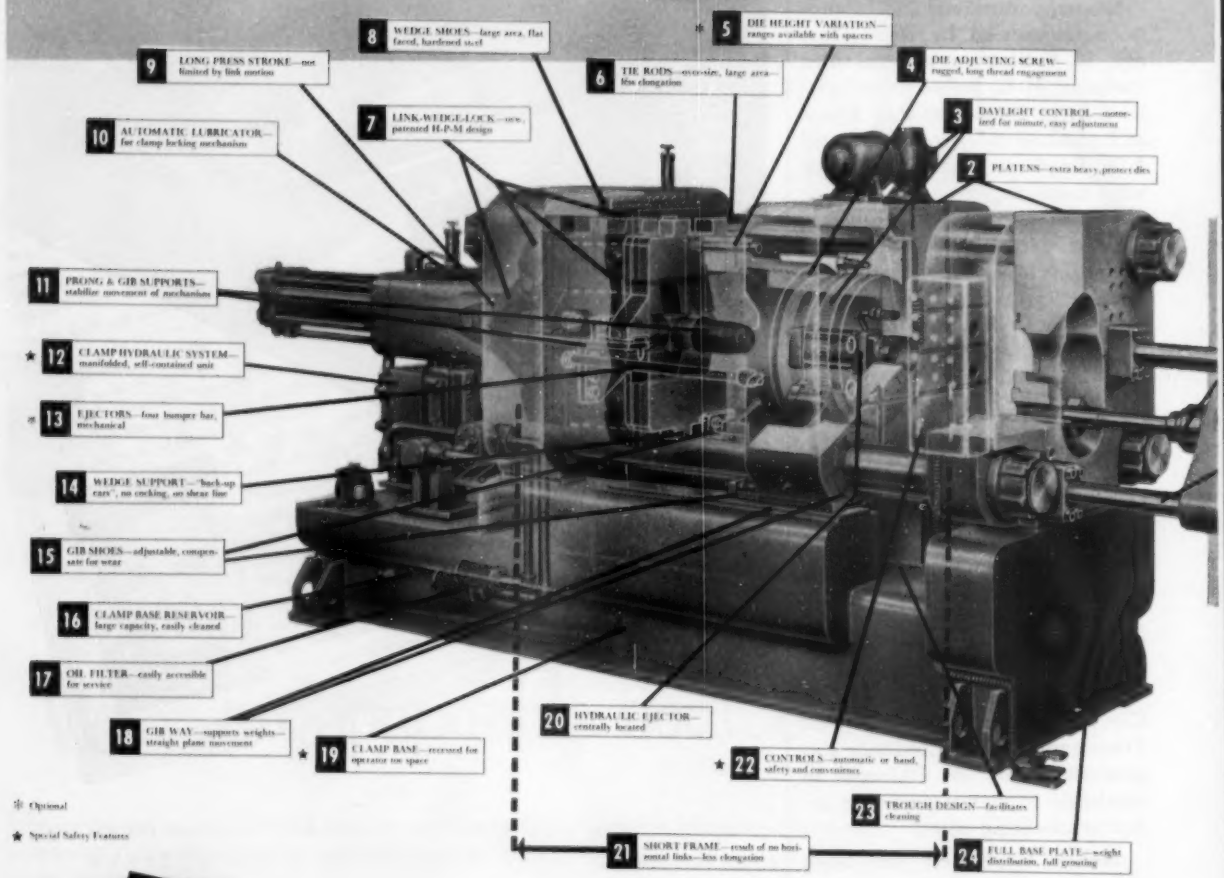
AUTOMOTIVE
APPLIANCE
& PLUMBING HARDWARE

GRAND RAPIDS BRASS COMPANY
DIVISION OF CRAMPTON MANUFACTURING CO.
99 Front Avenue, N.W. Grand Rapids, Michigan

H-P-M Offers Much More Than a

NEW APPROACH

All New Self-Contained Clamp End


1
2 PLATENS—extra heavy, protect dies
3 DAYLIGHT CONTROL—motorized for minute, easy adjustment
4 DIE ADJUSTING SCREW—rugged, long thread engagement
* 5 DIE HEIGHT VARIATION—ranges available with spacers
6 TIE RODS—over-size, large area—less elongation
7 LINK-WEDGE-LOCK—new, patented H-P-M design
8 WEDGE SHOES—large area, flat faced, hardened steel
9 LONG PRESS STROKE—not limited by link motion
10 AUTOMATIC LUBRICATOR—for clamp locking mechanism
11 PRONG & GIB SUPPORTS—stabilize movement of mechanism
★ 12 CLAMP HYDRAULIC SYSTEM—manifolded, self-contained unit
* 13 EJECTORS—four bumper bar, mechanical
14 WEDGE SUPPORT—"back-up cars", no cocking, on shear line
15 GIB SHOES—adjustable, compensate for wear
16 CLAMP BASE RESERVOIR—large capacity, easily cleaned
17 OIL FILTER—easily accessible for service
18 GIB WAY—supports weights—straight plane movement
★ 19 CLAMP BASE—recessed for operator toe space
20 HYDRAULIC EJECTOR—centrally located
★ 22 CONTROLS—automatic or hand, safety and convenience
23 TROUGH DESIGN—facilitates cleaning
21 SHORT FRAME—result of no horizontal links—less elongation
24 FULL BASE PLATE—weight distribution, full grouting

* Optional

★ Special Safety Features

40 Proven Performance Features—

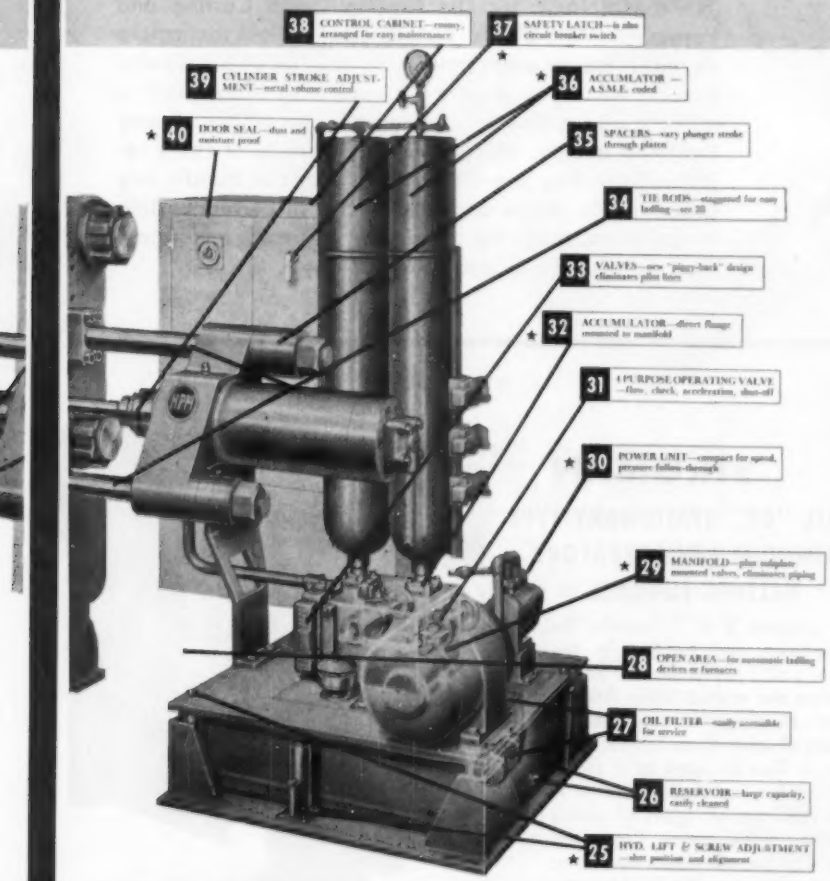
are illustrated and explained in detail in H-P-M's new die casting machine bulletin. Specifications on Cold Chamber and Gooseneck machines also shown.

Write for your free copy of Bulletin No. 5400 today!

New Machine Design . . . SEE THIS

TO DIE CASTING!

All New Self-Contained Injection End


38 CONTROL CABINET—roomy, arranged for easy maintenance
37 SAFETY LATCH—is also circuit breaker switch
39 CYLINDER STROKE ADJUSTMENT—metal volume control
36 ACCUMULATOR—A.S.M.E. coded
40 DOOR SEAL—dust and moisture proof
35 SPACERS—vary plunger stroke through platen
34 TIE RODS—staggered for easy bolting—see 28
33 VALVES—new "piggy-back" design eliminates pilot lines
32 ACCUMULATOR—direct flange mounted to manifold
31 4 PURPOSE OPERATING VALVE—flow, check, acceleration, shut-off
30 POWER UNIT—compact for speed, pressure follow-through
29 MANIFOLD—plus subplate mounted valves, eliminates piping
28 OPEN AREA—for automatic trolling devices or furnaces
27 OIL FILTER—easily accessible for service
26 RESERVOIR—large capacity, easily cleaned
25 HYD. LIFT & SCREW ADJUSTMENT—shot position and alignment

GREATEST Advance In Die Casting Machines In 15 Years!

● Here's the machine die casters have been looking for . . . H-P-M's brand new approach to die casting!

More than 40 new and improved performance features . . . revolutionary new self-contained injection end and clamp end design . . . many important, exclusive H-P-M design contributions are combined in the new H-P-Ms to give you the ultimate in die casting machine performance.

Cold Chamber machines . . . for aluminum, brass and magnesium alloys . . . are available in 200, 400, 600, 800 and 1000 ton capacities as standard and up to 3000 tons on special order. Gooseneck models . . . for zinc, lead and tin . . . include standard 100, 250, 400 and 600 ton machines and up to 1500 ton capacities on special order.

Be the first to cash in on higher production . . . better quality parts of high density, close tolerances and superior finish . . . with minimum scrap or salvage. Get the facts on the most advanced die casting machine in the industry from an H-P-M sales engineer today!

HPM

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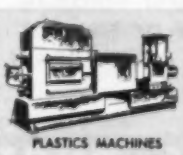
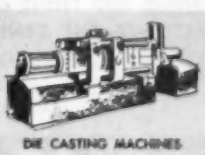
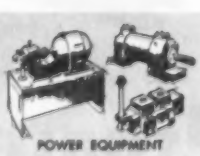

PLASTICS MACHINES


DIE CASTING MACHINES

C—PRESSES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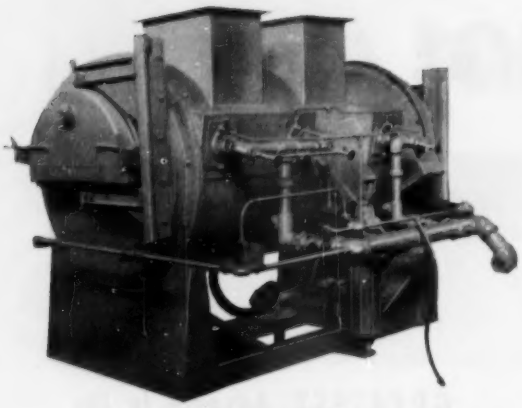
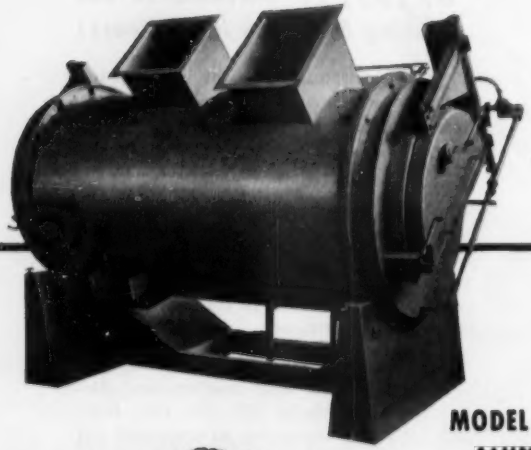
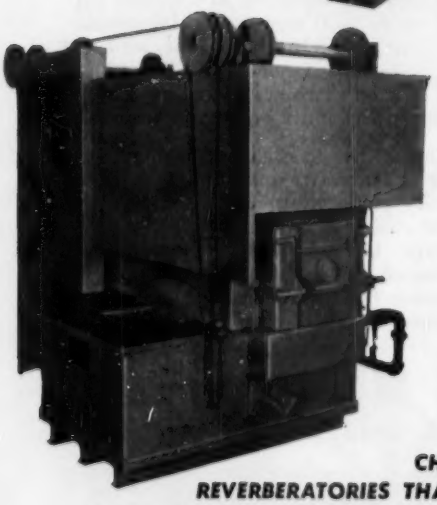




THE FAMOUS MODEL "DC" ALUMINUM REVERBERATORY FURNACE NOW AVAILABLE WITH...

Pneumatic Tilt Operation

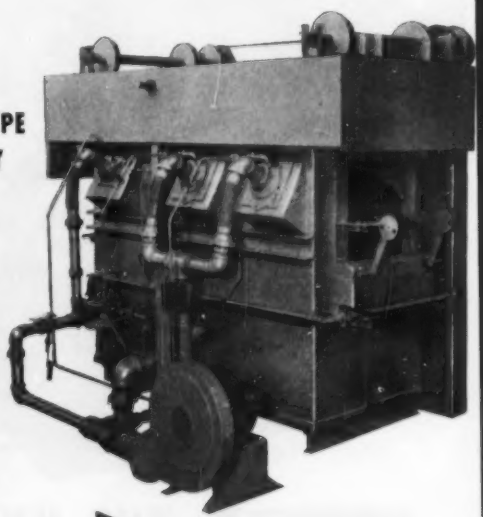
Stroman again sets the pace in the aluminum melting field with their new TILTING TYPE "DC" REVERBERATORY FURNACE for Die Casting, Sand Casting and Permanent Mold plants. Built to specifications that assure perfect metal on every pour, they melt faster, keep metal flowing when you want it . . . are most economical to operate and maintain . . . and assure castings of only the finest quality, which means a minimum of costly rejects. Truly they are the furnaces that can handle any capacity you desire and have metal at correct casting temperature, ready for pouring at all times. Investigate their possibilities in your plant to-day.



STROMAN

MODEL "DC" STATIONARY TYPE ALUMINUM REVERBERATORY MELTING FURNACE

The original 2 in 1 furnace for breakdown and holding in the same unit. Cold metal never reaches the molten bath. Assures metal of finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Is also ideal for all types of plants as tilting model above. Capacities from 350 lbs. aluminum up. Either type furnace may be fired by gas or oil, or combination gas-oil burners.



CHECK ON THESE GREAT STROMAN REVERBERATORIES THAT ARE THE ZENITH OF EFFICIENT AND ECONOMICAL ALUMINUM MELTING. DO IT TODAY!

Stroman makes all types of furnaces for the melting of brass, bronze, aluminum, magnesium, zinc, grey iron and all types of non-ferrous metals. Write for complete catalogue today.

STROMAN FURNACE & ENGINEERING CO.

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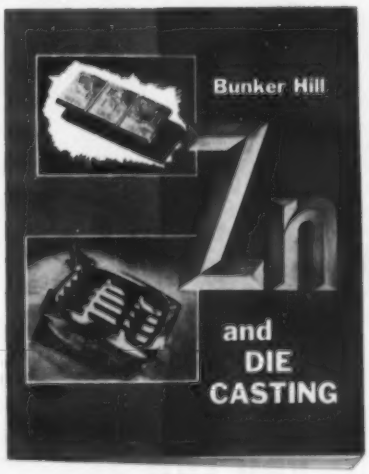
HERE is the story of.....



DIE CASTING
as a high-speed, low-cost production tool

ZINC
and its advantages as a base metal for die castings

BUNKER HILL'S
contribution to the phenomenal growth of the die casting industry

This new 8½ x 11", 24-page publication is yours for the asking. Write for copy on your company letterhead please.

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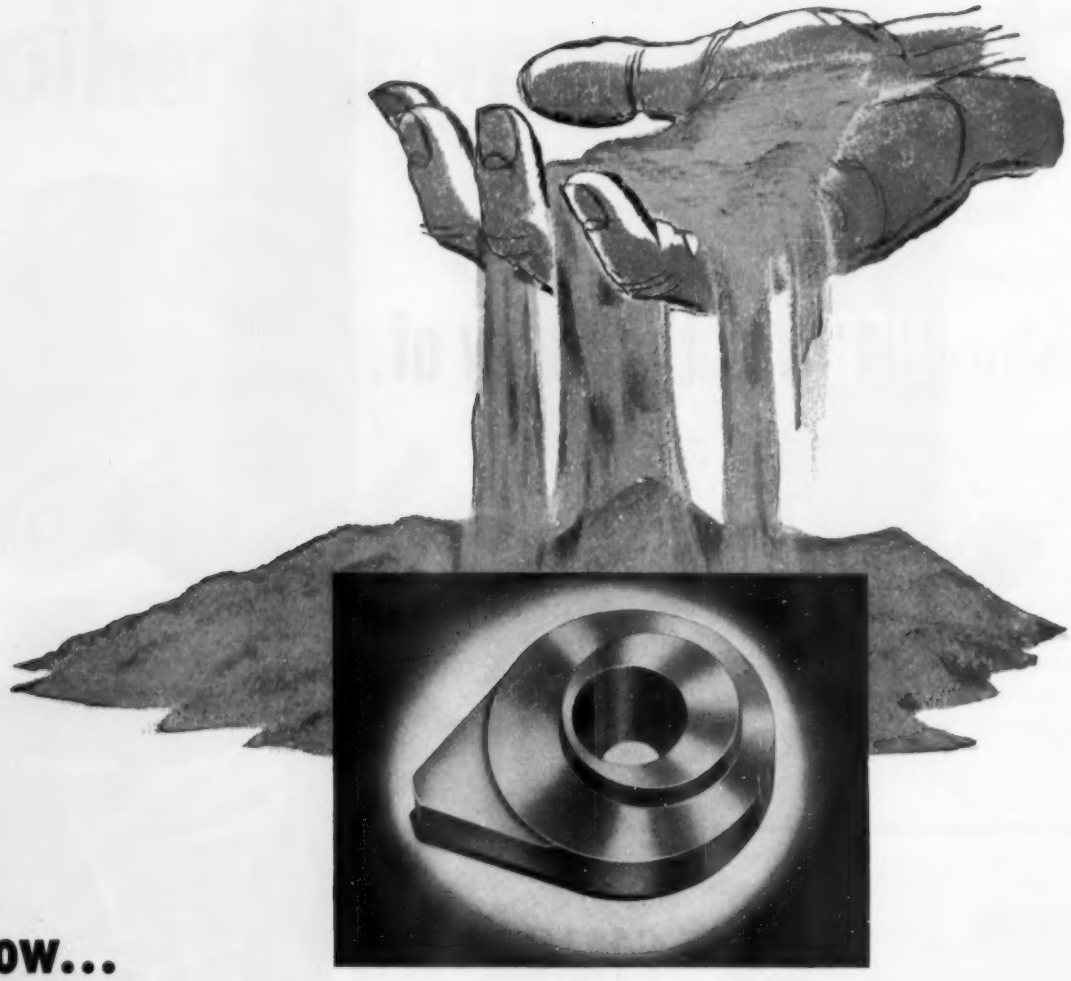
THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES



Now...

from America's finest precision parts plant you can get Highest-Quality Powder Metal Parts

Your most rigid specifications for top-quality powder metal parts of all alloys can be met fully and promptly by the Metallurgical Products Division of Thompson Products. Our experience in producing millions of parts to commercial and aircraft tolerances enables us to supply accurate, properly engineered parts in large or small quantities at lowest prices compatible with highest quality. This engineering and metallurgical experience can help you redesign to fully utilize the strength and economy of powder.

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ELECTROLYTIC IRON SINTERINGS

★ *increase output*

★ *reduce production costs*

★ *improve product quality*

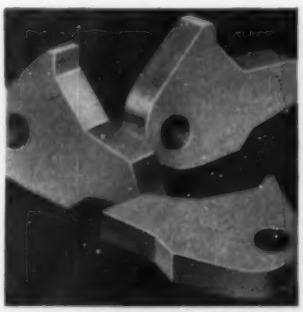
★ *lengthen product life*

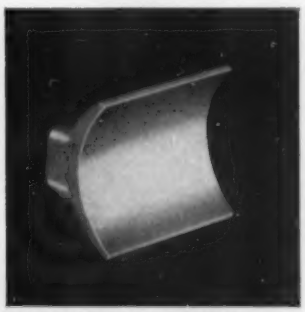
Electrolytic iron powder, as produced by Plastic Metals, is ideally suited for compacting parts where strength, precision, finish and high resistance to wear are prime requirements.

Examples shown on this page illustrate just a few applications where sinterings made from Plastic Metals electrolytic iron powder have proved to be advantageous cost-wise, production-wise and quality-wise. Many other prominent manufacturers are using Plastic Metals electrolytic iron powder with continued success.

Your products may offer opportunities for the profitable use of electrolytic iron powder or other types of metal powders in the making of parts. We can put you in touch with reliable and fully experienced fabricators who will be glad to consult with you and help you to determine whether metal powders are applicable.

IMPELLER BLADES made by Presmet Corporation for flywheel of Westinghouse "Waste-Away" garbage disposer. Electrolytic iron powder sinterings replaced former alloy castings. Costly machining eliminated and product life increased substantially.

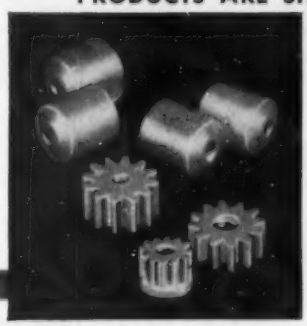


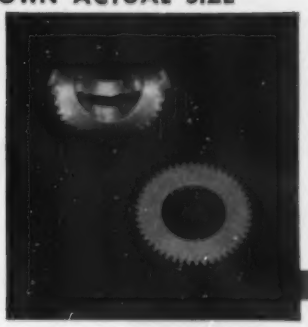


AIRPLANE CONTROL MOTOR POLE PIECE of electrolytic iron powder made by Moraine Products Division of General Motors Corporation. This part required powder of extreme purity and softness for magnetic properties. Electrolytic iron powder provided a high quality product with reduced production costs.

PRODUCTS ARE SHOWN ACTUAL SIZE

MODEL LOCOMOTIVE GEARS AND CURRENT COLLECTOR ROLLERS made of electrolytic iron powder by The Lionel Corporation. Requirements—uniform high purity for electrical conductivity and toughness to withstand hard wear. High density for gears. Precision, longer life and lower cost achieved.





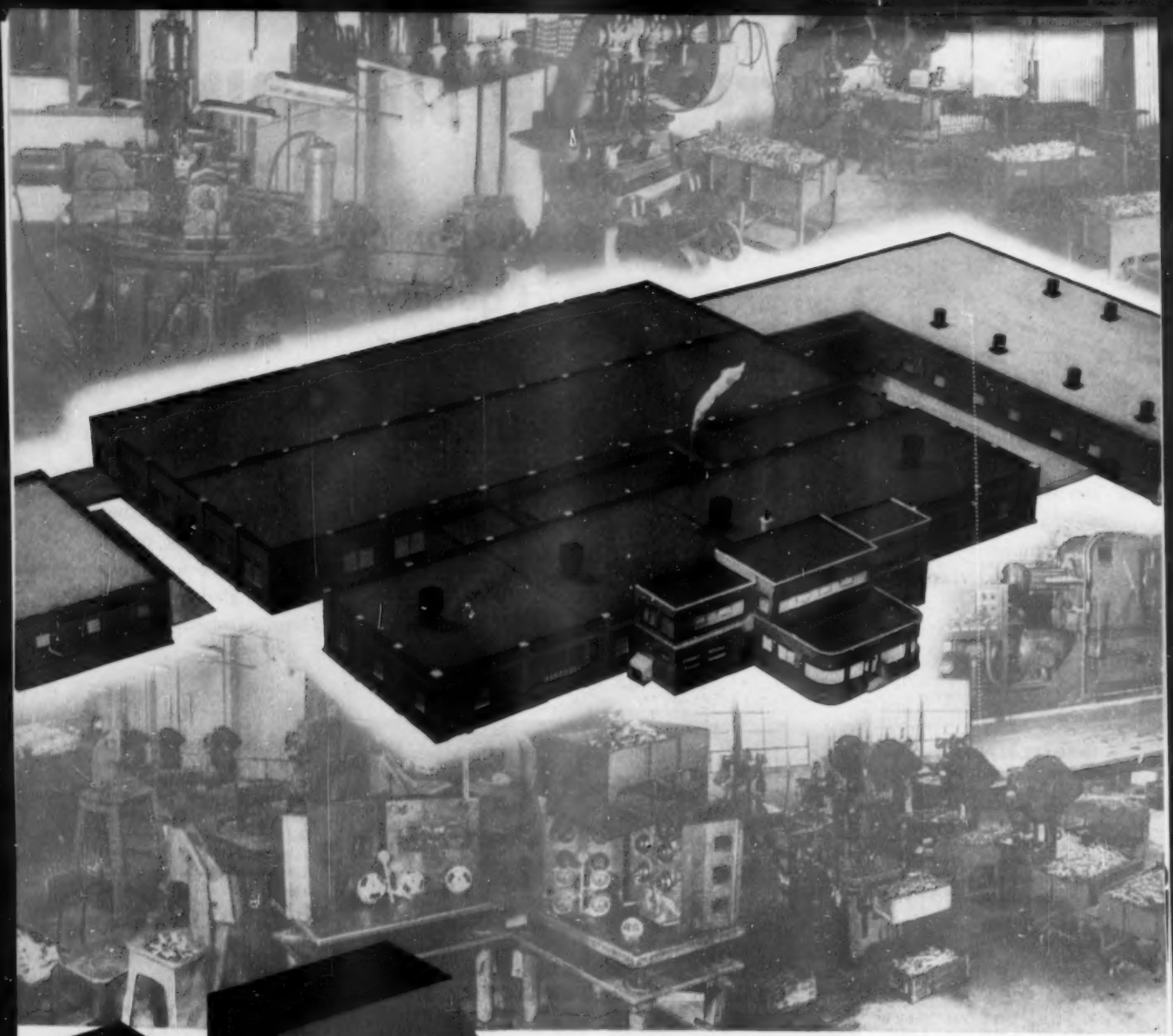
HEAVY DUTY AIRCRAFT INSTRUMENT GEAR made of electrolytic iron powder by Pow-Met Industries, Inc. Note bent specimen demonstrating toughness and ductility prior to heat treatment. After heat treatment, they are capable of obtaining physical characteristics equivalent to heat-treated steels. Observe precision of fine teeth.

PLASTIC METALS

DIVISION OF THE NATIONAL RADIATOR COMPANY
JOHNSTOWN, PENNSYLVANIA

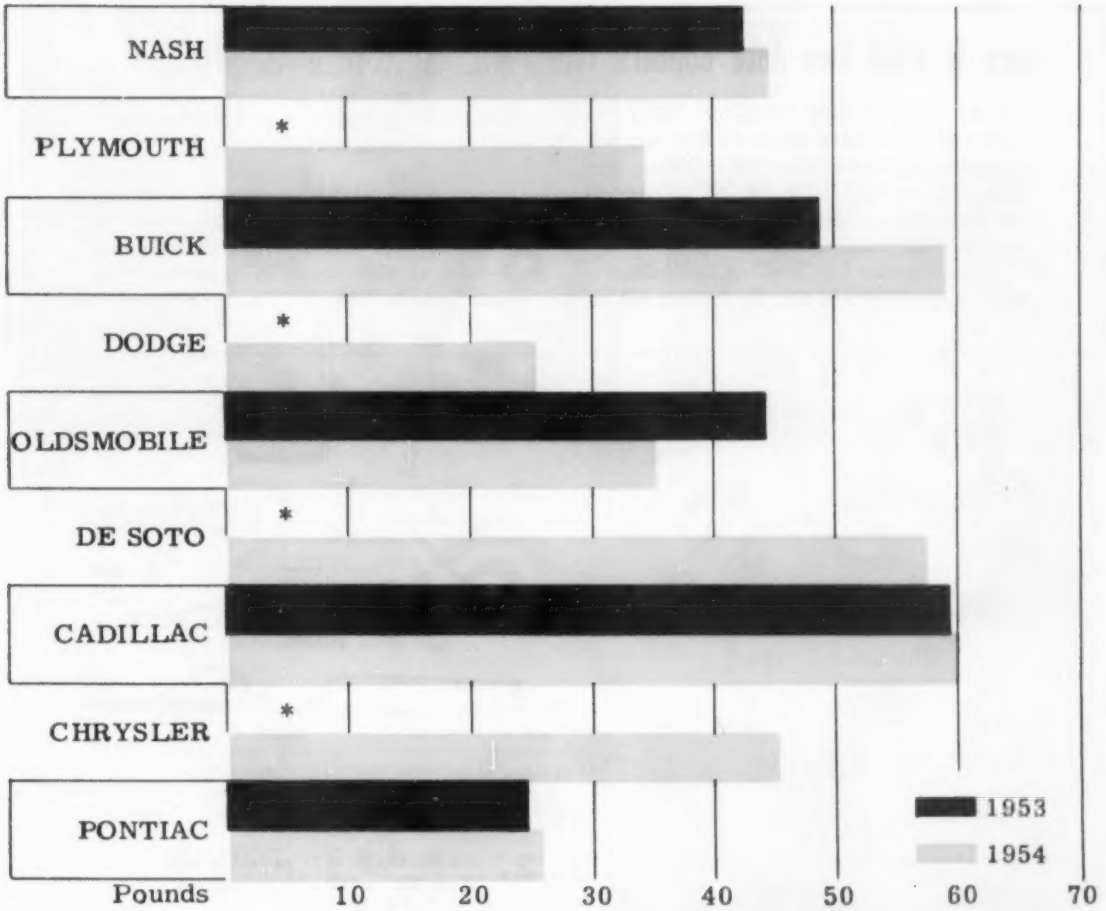
Write to Plastic Metals for further information on the successful usage of electrolytic iron powders.

For more information circle No. 60 on the Reader Service Card



60,000 square feet of complete, modern die casting facilities

NEW ENGLAND DIE CASTING CO., 445 FRONT AVE. WEST HAVEN, CONN.



1. COMPARISON of 1953-1954 usage of die cast zinc by several major auto-builders, according to American Zinc Institute study. (* — No 1953 figures available.)

How Many Pounds Of Zinc Die Castings Go Into Today's Cars...?

AUTOMOTIVE manufacturers are continuing to specify zinc die castings in passenger car applications where cost considerations, good appearance, close tolerances, intricate detail and impact strength are important factors. A recent study made by the American Zinc Institute shows that while appearance design changes and improvements in functional parts brought about increases or decreases in individual car usage, the overall picture for zinc die casting usage on the 1954 models remains about the same as it was in 1953. (See Figure 1).

Of the manufacturers studied, Buick made the most significant increase (21 percent by weight) in use of zinc die castings. A sample of Buick usage is shown in Figure 2. Oldsmobile showed the most significant reduction, using 16 percent less zinc die castings by weight than in the previous year. No changes were made by Oldsmobile, however, in the nature of die casting usage; the difference in weight (43 pounds per car in 1953; 36 pounds in 1954) results from basic styling design changes.

Chrysler products continue substantial usage of die cast zinc parts with DeSoto's 57 pounds topping the list. Two other important users on a total weight basis are Buick (59 pounds) and Cadillac (60 pounds). The Cadillac figure represents zinc usage exclusive of body components

Continued next page

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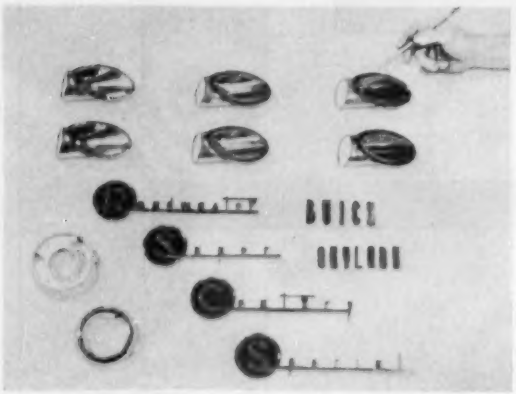
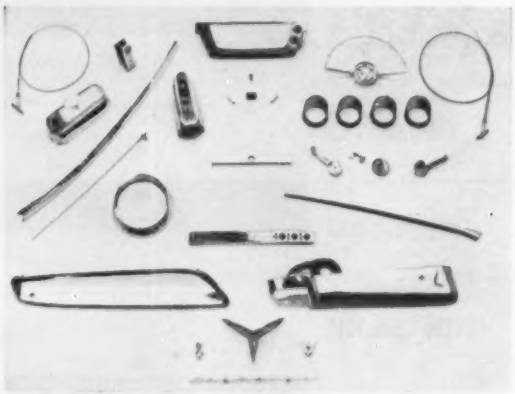
Here Is What Two Auto Builders Told PMM About Their 1955 Plans . . .

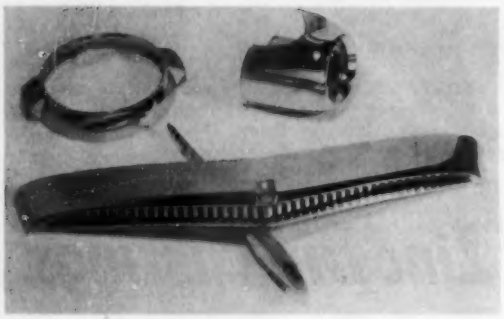
WHAT WILL BE THE TREND IN 1955? The editors of PMM asked engineers from two major automotive companies this question, and learned that at least as many zinc die castings will be found in next year's models as were used in 1954. Here are the trends:

A spokesman for Chrysler Corp. indicated that the use of plated zinc die castings will be substantially increased in its 1955 passenger cars, as compared with 1954.

Builders of the Nash pointed out that, due to the very satisfactory past performance of zinc die castings used by Nash, this company will make no cutbacks in its applications for die cast zinc in 1955.







2. AN INCREASE of 21 percent in use of zinc die castings such as these, top left, is reported by Buick.

3. FORD PARKING lamp body, Lincoln headlamp door and Mercury hood ornament are among zinc die castings used in these cars, below left.

4. DECORATIVE PARTS, above right, represent Studebaker's broad use of zinc die castings.

Zinc Die Castings In Cars — Cont.

(body guards, handles and the like). Nash and Pontiac each report a 4 percent increase; Nash uses 44½ pounds and Pontiac 26 pounds.

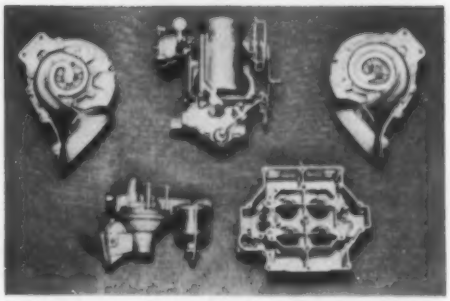
How Zinc Die Castings Are Used

Greatest automotive use of die cast zinc is ornamental. Moldings, ornaments and emblems make up the bulk of this group, although some parts like horn rings, instrument panels and door handles can be functional as well. Parts shown in Figure 4 are representative of Studebaker's broad use of zinc alloy in their 1954 models.

Decorative parts are usually die cast of S.A.E. alloy 903 and are chromeplated, painted or both. Ease of plating and polishing, ease of painting, ability to produce complex shapes and thin sections to close tolerances, high impact strength and low cost are among the reasons for the wide use of zinc alloy in appearance parts. The Chevrolet hood ornament and trunk lid emblem are both chrome-plated zinc die castings, Figure 5 The emblem is a good example of combined plating-painting for decorative effect.

Functional automotive parts are frequently designed as zinc alloy die castings. Where better corrosion resistance, tensile strength and hard-

DIE CASTINGS

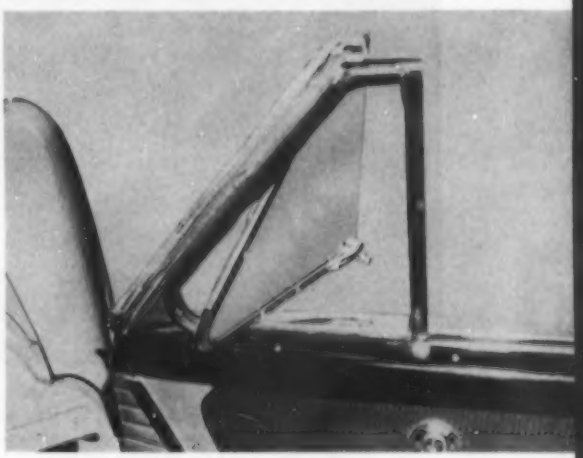


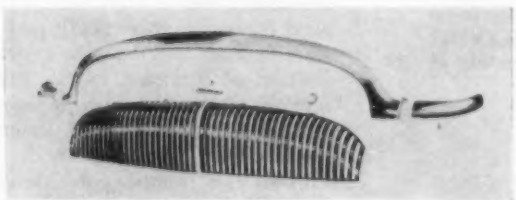
5. START AND FINISH of die cast zinc hood ornament on the Chevrolet is shown, above, with gate of castings emerging from the die, and chrome plated casting getting final inspection.

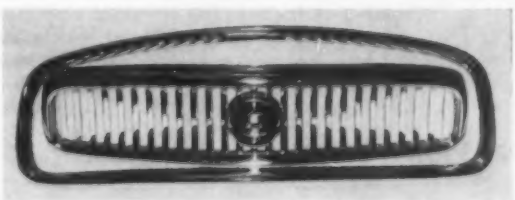
6. FUNCTIONAL USE of zinc die castings in the Studebaker, above right.

7. BUICK radiator grille, below left, is built of die cast zinc, as is the grille for the 1954 Nash, below right. The Packard grille chromium plating operation is illustrated beginning on page 59 of this issue.

8. FRONT WINDOW vent frame on the 1954 DeSoto "hardtop" coupe is chromium plated zinc die casting that provides high impact strength and excellent appearance, right.







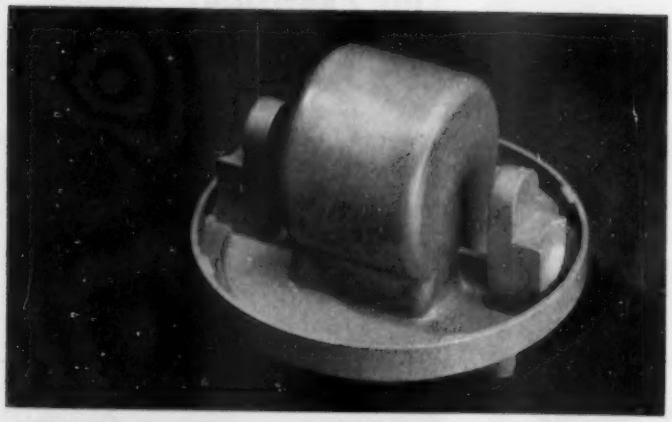
ness are vital considerations (usually in an unplated part) S.A.E. alloy 925 is generally used. This is identical with alloy 903 except with regard to copper content. This specification for the 903 is 0.10 percent maximum, while the 925 can have from 0.75 to 1.25 percent copper.

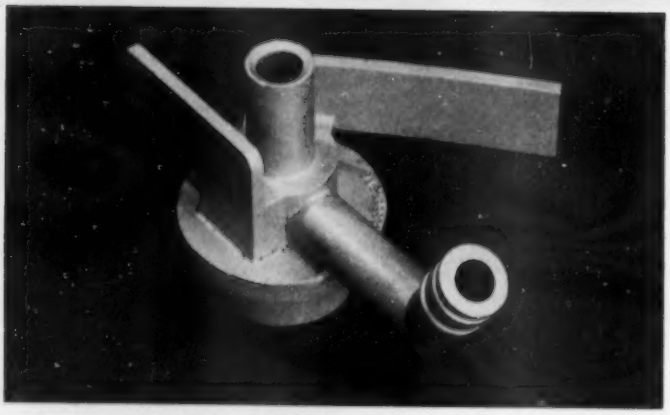
Nearly all automobile manufacturers use a zinc die cast carburetor and fuel pump, see Figure 6. High impact strength and lack of porosity are the main selection factors in these applications. Good holding strength in tapped holes is also important.

The largest single assembly of zinc die castings used on an automobile is the radiator grille. Buick, Packard and Nash, Figure 7 are examples of large die cast grille users. An interesting application is shown in Figure 12. This 1954 DeSoto "hardtop" coupe front window vent frame is designed to provide unusual strength in an extremely complex shape.

The automotive industry has traditionally consumed about half of the zinc alloy die castings produced in this country. Based on the American Zinc Institute's study, it appears likely that the final 1954 tabulation will show that the auto makers have again conformed to the traditional pattern.

INVESTMENT CASTINGS





BERYLLIUM COPPER was selected for the investment castings shown in the two photos above. Pressure tightness and castability in thin sections, as well as nonmagnetic and heat treatable characteristics, are useful in the magnet housing at the top. The ordnance part shown in the lower photo illustrates the versatility of investment casting which has here replaced a welded assembly. Photos courtesy of Precision Metalsmiths.

PRESSURE CASTINGS

BERYLLIUM COPPER molds displayed above illustrate the wide range of pressure cast applications. In addition to molds for plastics, pressure castings are also employed for zinc die casting die cavities. Photo courtesy Manco Products, Inc.

Which Beryllium Alloy For Your

AMONG available precision casting methods, beryllium copper has become well established as a material for investment and pressure casting but has found only limited application in permanent-mold, die casting and plaster-mold techniques.

Although processing steps for investment casting are well known, little information has been published about pressure casting. Briefly, this process involves the pouring of molten beryllium copper around a master steel hob and applying pressure. Solidification takes place under pressure, producing an unusually dense structure with good compressive strength and a smooth surface. Accurate reproduction of intricate detail, thin sections, irregular parting lines, and raised numbers or letters are obtained by this method.

From an application standpoint, these casting processes can scarcely be considered competitive. Both are competitive, however, with sand castings and parts machined from wrought stock. Beryllium copper investment castings find use in communication, textile, ordnance, aviation, instruments, electronics, business machines, firearms, paper processing and miscellaneous electrical and mechanical applications.

Pressure castings, on the other hand, have usually been associated with molds for plastics, but they are now also finding use as zinc die casting dies, miscellaneous mechanical parts and drawing or embossing dies.

Copper Casting?

By J. T. RICHARDS, Chief Engineer
Penn Precision Products, Inc.

Investment castings are relatively small — generally running less than one pound in weight. Pressure castings, which range from several pounds to several hundred, are restricted in size only by existing equipment limitations. Both methods offer the same degree of precision tolerances.

Such advantages of beryllium copper as high strength and hardness, good conductivity and excellent corrosion resistance are well known. In addition, beryllium copper responds to heat treatment, so that castings can be machined in a relatively soft condition and then aged for three hours at 650 F. to obtain maximum strength and hardness.

Other useful characteristics include good resistance to wear and moderately elevated temperatures. With decreasing temperatures (at least to -300 F) there is no loss of room temperature ductility or shock resistance, suggesting good service with no yield strengths or elongation (see Table II).

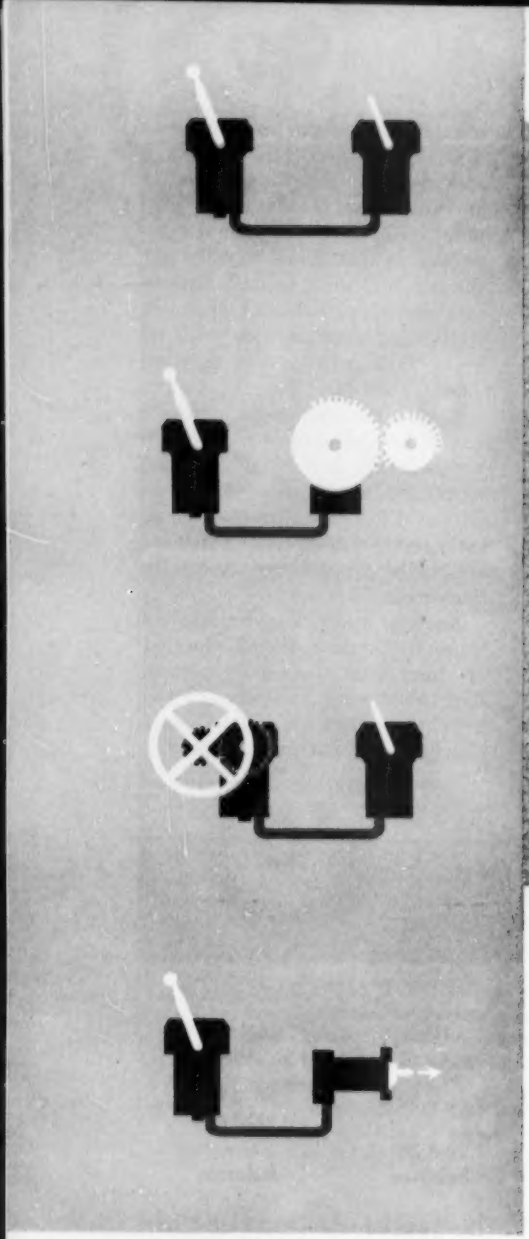
Consequently, indiscriminate use of hardness tests may prove misleading, particularly when employed as a means for comparing different materials. Similarly, conversions from hardness to tensile strength are especially dangerous.

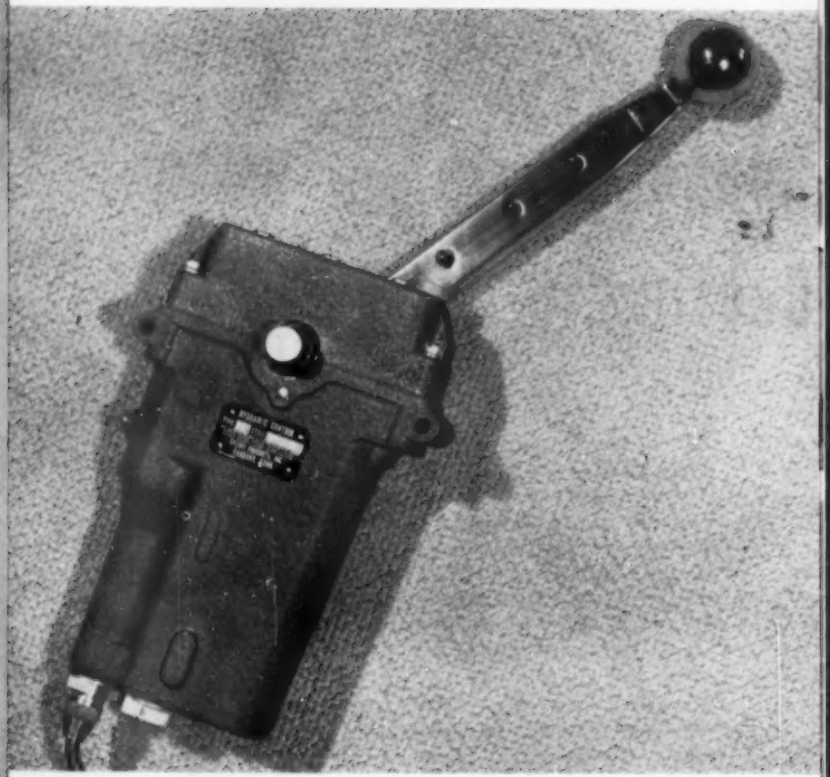
Each of these alloys plays an important role in the production of beryllium copper pressure and investment castings, however, some care should be exercised to prevent misapplication.

Continued on page 88

Composition And Typical Properties Of Beryllium Copper Casting Alloys

	Alloy 200-C	*Alloy* 240-C	*Alloy* 250-C
COMPOSITION			
Beryllium	1.90-2.15%	2.35-2.55%	2.50-2.75%
Cobalt	0.35-0.65	—	0.35-0.65
Nickel	—	1.00-1.20	—
Copper	balance	balance	balance
PHYSICAL PROPERTIES			
Density, lb per cu in.	0.292	0.293	0.292
Melting range, F	1600-1780	1585-1750	1570-1710
Solution-annealing range, F	1400-1500	1400-1500	1400-1500
Shrinkage, in. per ft	3/16	3/16	3/16
AVERAGE COEFFICIENT OF LINEAR EXPANSION			
Per deg F, 68 to 392 F	0.000009	0.000009	0.000009
HARDNESS			
Brinell, 300 kg load	352-426	360-435	393-460
Rockwell	C38-45	C39-46	C42-48
TENSILE PROPERTIES			
Ultimate tensile strength, psi	150-175,000	155-195,000	140-165,000
Elongation in 2 in., %	1-4	1-7	0-2
Reduction of area, %	1-5	1-8	0-2
Proportional limit (0.002% offset), psi	105-125,000	105-140,000	85-105,000
Yield strength (0.2% offset), psi	125-160,000	130-180,000	110-130,000
Elastic modulus, psi	18,000,000	18,500,000	18,500,000
ELECTRICAL PROPERTIES			
Conductivity, % IACS	20-25	20-28	18-23
THERMAL CONDUCTIVITY			
Cal/sq cm/cm/sec/°C	0.25	0.25	0.23





1. SCHEMATIC PLANS illustrate typical uses for Sperry hydraulic remote controls.

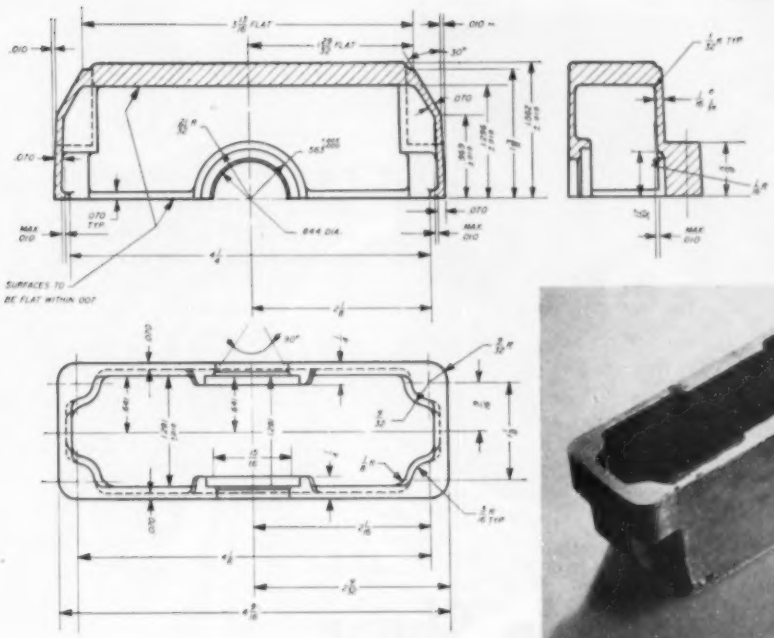
2. EXCELLENT DETAIL and close dimensions, inside and out, are gained by producing the cover the hydraulic remote control, above right, with plaster molds.

Castings in plaster molds pay off

For Development Work Or Full-Scale Production

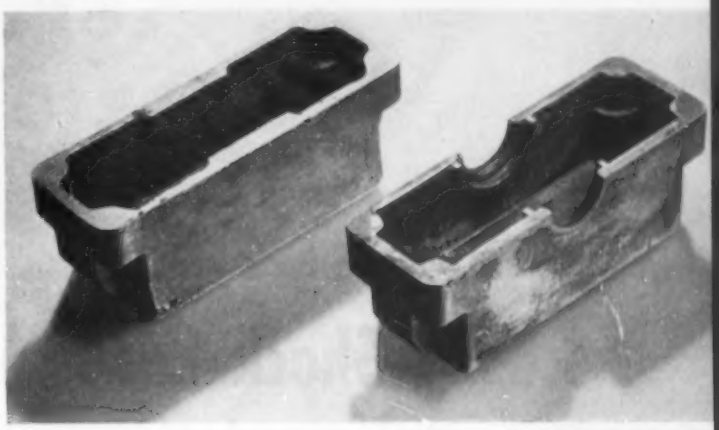
This major manufacturer of hydraulic devices uses many plaster mold castings. How, why and where this type of casting saves money is described here.

By JOHN COWAN, Development Engineer
Sperry Products Inc.



3. COMPARE CASTINGS produced in sand mold, below left, with one from a plaster mold, below right. Both are in as cast condition. Note difference in surface quality, amount of detail, and uniformity.

4. DRAWING of plaster mold casting, left, reveals tolerances and dimensions produced as well as thinner sections.



IN return for a relatively small investment in tools, plaster mold castings have saved Sperry Products, Inc., many production dollars by replacing sand castings where accuracy and surface finish requirements are high. This type of casting has been especially valuable for brass and bronze pieces which, as sand castings, required extensive machining and surface finishing operations.

Plaster mold castings have also been utilized by Sperry in product development work. New products are thoroughly tested in Sperry's laboratories and in the field. In order to finalize design details and prove functional efficiency, prototypes are sometimes constructed of plaster mold castings that duplicate the ultimate components, but without large expenditures for tooling. These prototypes are then tested and all necessary design changes made before production tools are ordered.

Two examples will illustrate the features outlined above. The cover for a type F hydraulic remote control is an example of the replacement of a sand casting; a new, portable remote control unit designed for low cost and wide usage, now being tested, has an aluminum plaster mold casting for its body. Alloy Casting Co., Inc., produces both of these castings.

Castings for production

How sand castings and plaster mold castings compare is graphically presented in Figures 3 and 4 showing the plaster mold cast cover for a hydraulic remote control and the sand casting it has replaced.

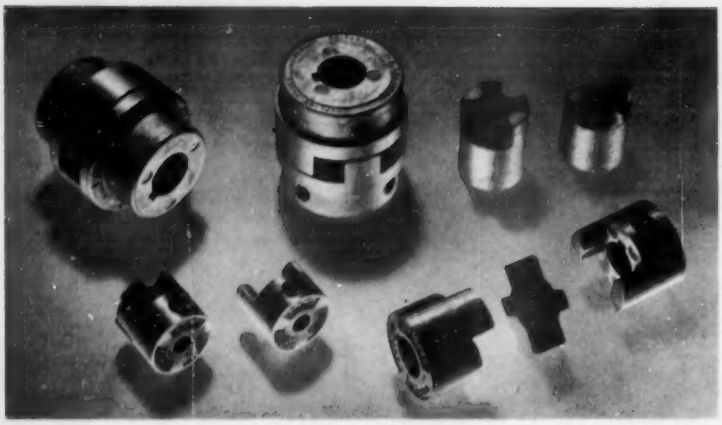
Surface quality, amount of detail in the raw casting and thinness of wall section can be contrasted in these two pieces. The alloy used in each casting is ASTM B198-48, a silicon brass composition.

The bearing retainer flange is a detail in these castings that illustrates the comparative quality of the two casting methods. The sand casting requires complete machining . . . the plaster mold casting not only has the flange detail cast in its finished form, but the dimensions are so close that no finish machining is required. The flange shoulder (See the drawing, Figure 4) has a cast diameter of .563+.005—.000.

Wall section can be closely controlled because of the high inherent accuracy of plaster mold casting, and hence, it has been possible to use thinner walls. Average wall section, as plaster mold cast, is .070. Top edge of the wall is thickened somewhat to provide a large enough sur-

Continued on page 87

DIE CASTINGS



THE TREND is toward use of die castings in place of sand castings for flexible couplings, especially in the smaller size range.

Flexible Couplings Designed To

Resist Shock Loads In Shear

By R. FERMIER, Vice-President
Lovejoy Flexible Coupling Co

THAT both zinc and aluminum die castings can be used in the type of service where the part is subject to shear or tension is demonstrated by the use of die castings for the body members of flexible couplings made by Lovejoy Flexible Coupling Co. of Chicago, Ill. While only the smaller couplings are being made today as die castings, the tendency toward larger sizes continues, particularly to the use of aluminum die castings which can be heat treated to increase the strength very materially.

Cost reduction in manufacturing is not the only reason for the swing to die castings. Weight reduction is also of prime importance. For many applications inertia of the prime mover must be held down to permit fast starts and stops and where aluminum can be substituted for cast iron the great reduction in mass can be a major design factor.

Shipping weights are another factor favoring the use of die castings, particularly aluminum die castings. Distribution of flexible couplings from a centrally located plant is nation wide and particularly on long freight hauls the possible savings in freight charges can have an important bearing on the cost of the coupling to the ultimate consumer.

Cost: A Major Factor

Finally, of course, there is the question of manufacturing costs. Where cast iron coupling members are used they must be machined all over. Machining of cast iron, while a standard operation, is costly both as a direct machining charge and as an extra high house-keeping cost due to the relatively large volume of dust that is generated in the operation.

With die cast coupling members most of the machining is eliminated and what little is left to do is of a minor nature. On the average piece, the center hole must be reamed, the set screw hole tapped and the OD turned. Where a key-way is needed, it is generally broached. The faces and lugs which fit against the rubber of leather flexible section are used as cast.

Surface finishing costs are again sharply reduced through the use of die castings. In most cases no surface finish is required unless it be strictly for decorative purposes. A few instances occur where protection against atmospheric corrosion is required and there one of the low cost chemical conversion coatings is adequate.

While present practice limits the use of die castings to the smaller sizes of couplings the trend is definitely to larger sizes and it is probable that in the near future some, at least, of even the largest couplings will be die cast whenever the quantities justify initial tool costs.

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TECHNICAL REPORT

By **JOHN W. YOUNG**, Vice President
Isthmian Metals, Inc.

Here Is The First Report On

High Strength Steel Parts

Produced By

A New Powder Metallurgy Process

This article is another PMM report on advanced work in powder metallurgy. At the present time, there has been only limited commercial production of parts by the process described.

STEEL parts from metal powders which are characterized by high density and a combination of hardness, strength, and ductility approaching very closely that of wrought material of the same alloy and carbon content are produced by new processes developed by Isthmian Metals, Inc. of Boston. Comstock & Wescott, Inc. was employed to do the technical work.

The mechanical properties attainable open up new fields for powder metallurgy products, particularly the production of small, close tolerance, highly stressed parts for guns, business machines, instruments, etc.

These processes are the result of a number of years of research in the field, covering both hot and cold pressing. Several patents have been issued[1] covering the principal features, and it is planned to license manufacturers to use these processes.

The steel produced by these processes can be heat-treated like ordinary wrought steels to yield a wide range of hardness and a corresponding range of tensile properties, as shown in Figure 1, 2 and 3.

The most important single factor in attaining high mechanical properties was found to be a high density ratio (low porosity). Density ratios well above 98 percent of full density are readily obtainable with the process.

It was found that whereas tensile strength is roughly proportional to the density ratio, other properties such as elongation and reduction in area and impact strength show a very abrupt improvement at a "threshold" density ratio of about 97 percent. Figure 4 shows the relation between density ratio and the percent reduction of area measured on tensile test specimens.

The methods used to obtain the necessary high-density ratio involve first, selection of suitable powders. These are compressed cold in two stages with an intermediate sintering. While a certain amount of the carbon may be introduced in the original powder mixture, if the steel is to contain a high carbon content most of the carbon is introduced by gas carburizing methods after the final pressing operation. After the carbon has been added, the piece may be heat-treated, case hardened, or electroplated by conventional methods to secure the desired surface condition, hardness, and mechanical properties.

These Are The Properties . . .

TABLE 1

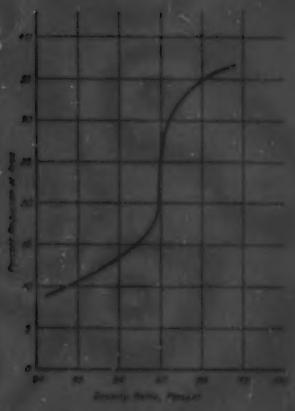
CLASS A STEEL — approximating the composition and properties of SAE 1020 Steel

Tensile Strength	Percent Elongation	Percent R. A.	Rockwell Hardness	Density Ratio
156,000	13	27	C-35	90% minimum
137,000	17	31	B-100	90% "
			C-23	
110,000	22	45	B-70	90% "

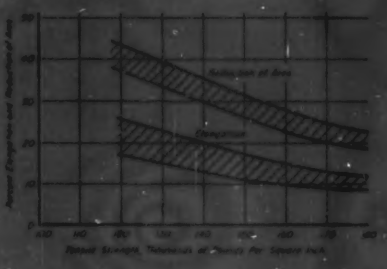
CLASS B STEEL — approximating the composition of SAE 1040 Steel.

Tensile Strength	Percent Elongation	Percent R. A.	Rockwell Hardness	Density Ratio
184,000	15	20	B-95	98.5% minimum
168,500	7	10	C-36	98.5% "
198,000	4	6	C-37	95.5% "

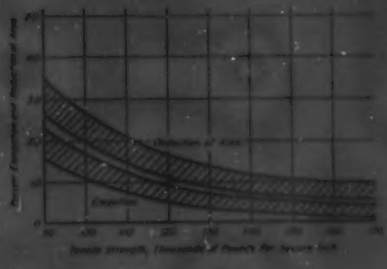
1. TABULATION of typical properties of material pressed from metal powders.



4. RELATIONSHIP between reduction of area in tensile test and density ratio.



2. MECHANICAL properties of Class A steel are charted here.



3. MECHANICAL properties of Class B steel are charted here.

What The Process Is And Where It Can Be Used

Typical pieces which are well adapted to manufacturing by the Isthmian process are shown in Figures 5 to 10.

In the case of the gun sear, Figures 5 and 8, the specifications required very close dimensional tolerances, together with good physical properties and a hardness of Rockwell C-48/53. In particular the dimension between the two parallel surfaces at the bottom of the part was required to be held to .030± .001. This had been found a difficult dimension to hold through the heat-treating for pieces made by conventional machining because of the non-symmetry of the piece. However, this dimension was maintained successfully in the powder metallurgy process.

The particular adaptation of the process used to produce these pieces accompanies Figure 5.

This resulted in parts having a surface hardness of Rockwell C-48/53 and a final density ratio in the range 98.4 percent or better. The carbon content of the steel was approximately 0.8 percent carbon at the surface and approximately 0.1 percent in the sections most distant from the surface.

The micro-structure was that typical of good wrought steel as is shown by the micro-photos in Figure 8.

Sears made by the Isthmian process were tested under actual firing conditions in a rifle for 20,000 rounds without failure or detectable wear. The estimated life expectancy of the weapon itself is 4,500 rounds. Production costs for this part are less than ½ those for more conventional methods of fabrication.

The bayonet butt plate shown in Figure 6 is costly to fabricate by conventional machining methods because of the rectangular hole, the T-shaped slot, and the eliptical contour. Under conventional methods of manufacture this part has been machined from bar stock and from steel forgings, hardened and tempered to Rockwell Hardness C-33/38.

Continued next page

Ordnance Parts Have Been Produced And Tested

These requirements indicated that the Isthmian Class A steel would be well-suited and the processing steps used for this part are outlined with Figure 6.

This produced parts of a hardness of Rockwell C-33/38 and a density ratio 98 percent or better. Parts so made were given simulated service tests and passed successfully in all cases.

The parts were also tested by inserting a T-shaped bar in the T-slot and another bar in the rectangular hole, and applying tensile stress until the parts ruptured at the T-slot. Parts made by the Isthmian Class A steel process showed a 50 percent higher strength in this test than pieces made from steel forgings. *This was due not to intrinsically higher strength of the Isthmian steel, but rather to the fact that the powder pressings had fillets in corners of the T-slot which were smoother and more perfectly formed than in the forgings.* This illustrates an advantage of powder pressings over machined parts which can frequently be realized.

Another part well-suited to the Isthmian processes is the accelerator shown in Figure 7. In this part, it was necessary to have more carbon in the core of the piece than in the core of the gun sear. For this reason the carbon content of the powder mixture was increased.

Because of the very thin wall section around the hole, it was not practical to briquet the piece with the hole. This was drilled afterward. Omitting the hole, it was found perfectly practical to obtain the necessary high density throughout the piece.

Processing steps used for this piece accompany Figure 7.

These steps produced pieces with a high carbon hard case and a medium carbon tough core. The surface hardness was Rockwell A-76/77 and density in the range ratio 98.5 percent or better. The microstructures of the case and core are shown in Figure 9.

Other parts which can be made to advantage by the Isthmian processes are the revolver cylinder and the gear segment in Figure 10.

In obtaining the high density ratio necessary for the superior mechanical properties obtained by these processes, it is first necessary that the iron powder used should be annealed soft, should contain not over .3 to .5

Production Methods On Three Pieces . . .

5. GUN SEAR

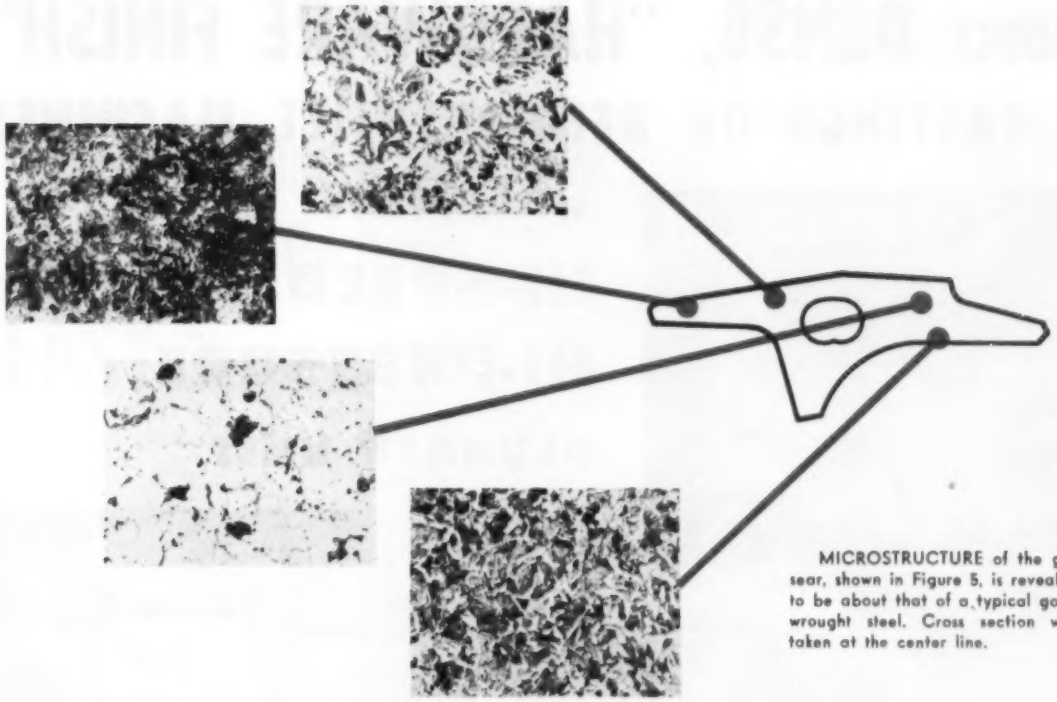
Powder Mix: Annealed electrolytic iron powder (-50 mesh) blended with ½% stearic acid, 0.05% carbon, and 0.63% ferro-manganese.
Briquetting: Approximately 27 tons per square inch pressure on Stokes R-4 mechanical press.
First Sinter: 2 hrs. at 2000 F in cracked ammonia atmosphere.
Lubrication: Thin soap film.
Coining: 72 tons per square inch pressure.
Carburizing and Equalizing: 8 hrs. at 1850 F, in cracked ammonia-methane atmosphere in equilibrium with 0.8% carbon.
Machining: Conical shaped hole and semi-circular shape around hole machined.
Quenching: In oil, from 1500 F.
Tempering: 575 to 600 F.

6. BAYONET BUTT PLATE

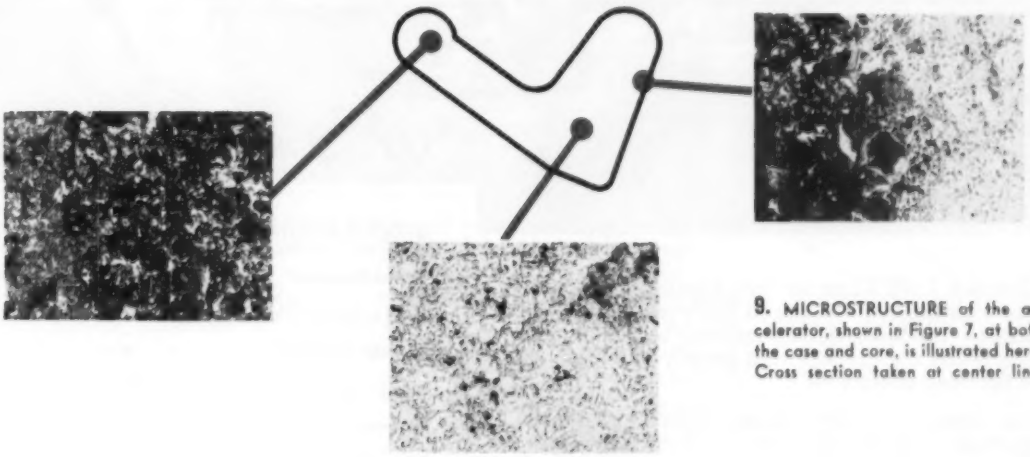
Powder Mix: Annealed electrolytic iron powder (-100 mesh) blended with 1% stearic acid and 0.9% manganese.
Briquetting: 33 tons per square inch pressure.
First Sinter: 3 hrs. at 2000 F in dry hydrogen.
Lubrication: Thin film of stearic acid.
Coining: 100 tons per square inch pressure.
Anneal: 1 hr. at 1000 F in dry hydrogen.
Machining: Mill side slots, drill hole, broach tips.
Carburizing: 8 hrs. at 1700 F in hydrogen-propane mixture.
Equalizing: 14 hrs. at 1700 F in hydrogen-methane mixture.
Quench: In oil, from 1550 F.
Temper: ½ hr. at 900 to 925 F.

7. ACCELERATOR

Powder Mix: Annealed electrolytic iron (free flowing) blended with 0.25% carbon, 0.63% ferro-manganese and 0.5% stearic acid.
Briquetting: Approximately 27 tons per square inch pressure, on Stokes R-4 mechanical press.
First Sinter: Held 2 hrs. at 2000 F in a cracked ammonia-methane atmosphere in equilibrium with 0.2% carbon.
Lubrication: Thin soap film.
Coining: 80 tons per square inch pressure.
Annealing: 1 hr. at 1200 F.
Machining: Drill and chamfer hole.
Carburizing: 1 hr. at 1600 F.
Quench: In oil, from carburizing.
Temper: 1 hr. at 325 to 350 F.



MICROSTRUCTURE of the gun sear, shown in Figure 5, is revealed to be about that of a typical good wrought steel. Cross section was taken at the center line.



9. MICROSTRUCTURE of the accelerator, shown in Figure 7, at both the case and core, is illustrated here. Cross section taken at center line.

percent of non iron ingredients (other than carbon, which should not be over 0.15 percent), and undissolved inclusions not over 1 percent by volume. Annealed electrolytic iron powder fulfills these requirements and is a satisfactory material.

In order to secure good heat-treating properties in the final part, it is necessary to introduce some manganese into the steel. This is done by the inclusion of a small percentage of ferro-manganese powder in the initial powder mixture.

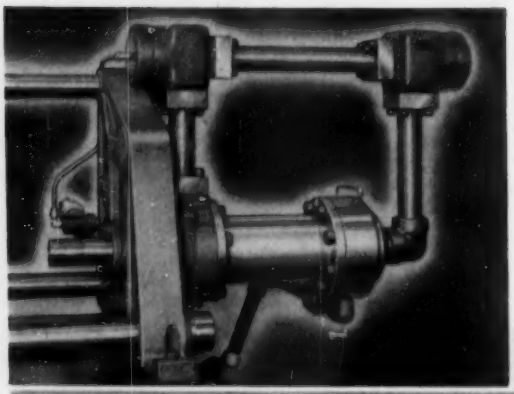
However, when a compact of iron powder containing ferro-manganese is sintered, the manganese invariably becomes oxidized as a result of oxygen and water which is always present in powder compacts either chemically combined with, or sorbed by, the iron. If oxidized, the manganese remains undissolved, and has a harmful rather than a beneficial effect on the steel.

In order to avoid this, powdered graphite is also included in the powder mixture, the amount being determined by the oxygen content of the iron and the percentage of carbon which is wanted in the core of the compact after sintering. During sintering this graphite prevents oxidation of the manganese, a part of the graphite being removed from the compact in so doing.

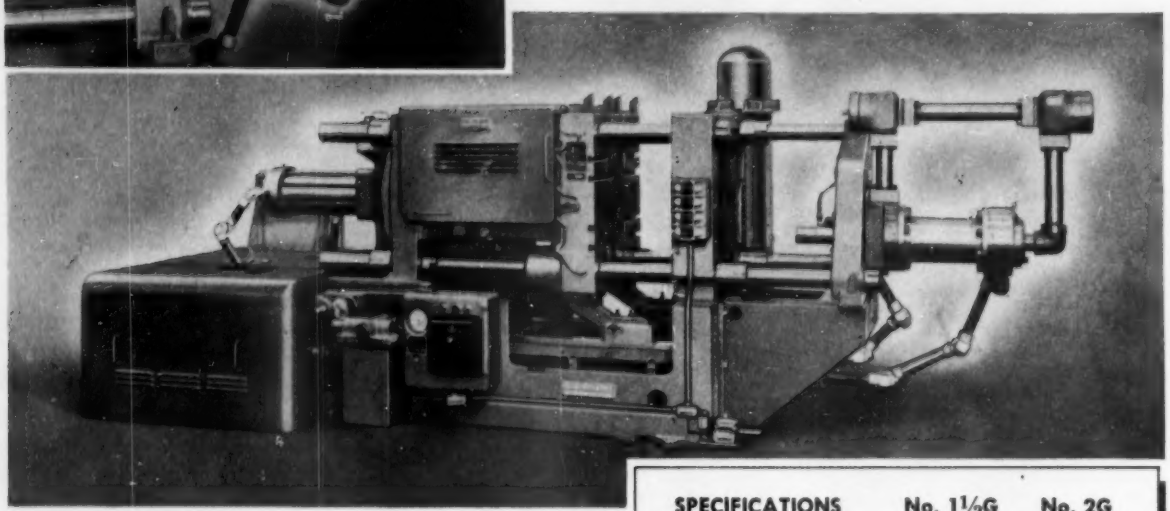
In making Class A steel the carbon content of the core of the compacts is reduced to about 0.1 percent during sintering which leaves the compacts soft enough to be re-pressed easily to density

Continued on page 89

PRODUCE DENSE, "HARDWARE FINISH" DIE CASTINGS ON REED-PRENTICE MACHINES



with NEW HI-SPEED HI-PRESSURE PLUNGER UNIT



Reed-Prentice Cold Chamber Die Casting machine — equipped with the new "Hi-Speed Hi-Pressure" Plunger attachment—produces dense, unblemished aluminum and magnesium die castings that greatly eliminate expensive finishing operations.

Effecting lower unit costs, these higher quality die castings result from *actual plunger speed of 10,000 inches per minute* combined with a final squeeze at high pressure.

The "Hi-Speed Hi-Pressure Plunger" attachment can readily be applied to Reed-Prentice No. 1½G and 2G machines now in use and can be furnished as an extra on new 1½G and 2G machines.

SPECIFICATIONS	No. 1½G	No. 2G
Size of die plates	32 x 29"	38 x 36"
Space between tie bars	20 x 15"	23½ x 23½"
Diameter of tie bars	4"	4½"
Die opening	10¼"	14"
Maximum die space	22"	30"
Die locking pressure, tons	250	400
Capacity per shot (Aluminum)	3.75 lbs.	9 lbs.
Machine weight, lbs.	14,500	22,700

Write for Catalog #1154 giving details on Reed-Prentice Die Casters

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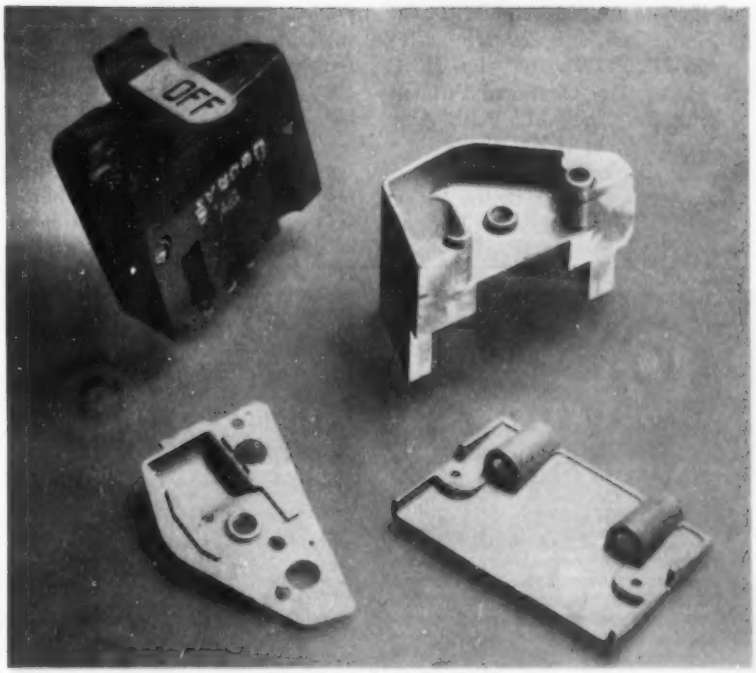
ODD Shapes Can Be EASY Shapes



VARIED CONTOURS of this aircraft safety device are so important that 100 percent dimensional check on contours is required. Complete assembly gets 8-hour freezing test.

THE housing of an aircraft instrument is likely to have to fit into left-over space, compressed by necessity into strange geometric shapes. The dimensions and contour are dictated largely by the difference in size between the mechanism it houses and the available space into which it must be squeezed, since every inch of space and every ounce of weight in an airplane is at a premium.

After the instrument designer has compressed the unit into the smallest possible cube, and adapted it to the shape of the available space, he usually finds that the housing is odd-shaped, with walls thinner than he might otherwise choose for easy fabrication. Accurately located pads, bosses, holes and sealing surfaces more often than not complicate the design.

It is no surprise, then, to find that manufacturers of aircraft instruments make extensive use of investment castings in aluminum for housings and other components that are, of necessity, complex, thin-walled, especially accurate or light weight.

How this works out in practice is well illustrated by a small instrument manufactured by the Syncro Corporation of Oxford, Mich. This is called a power failure indicator, built to operate with a variable gyroscope indicator in jet aircraft. Basically, it is built around a discriminator coil which must be receiving the full electrical output of three phases to permit the flow of power into an actuator coil. One or more phase failures will block the discriminator coil, dropping a red "Off" signal into the pilot's view.

The power failure indicator, and the three thin-walled investment castings which compose its outer shell, are illustrated above. All three of these castings are produced by the W. H. Anderson Company for Syncro.

The exceptionally thin wall sections, particularly in the main casting, are worth noting, because this complicates the foundry job of producing the pieces. Average wall thickness is .030 to .035.

All castings are normalized four hours for stress relief because of the high requirements for stability of the castings under all operating conditions. After normalizing, the castings are straightened.

Testing of these castings for contour, dimension and stability represents a major part of the cost of producing the instrument because of the

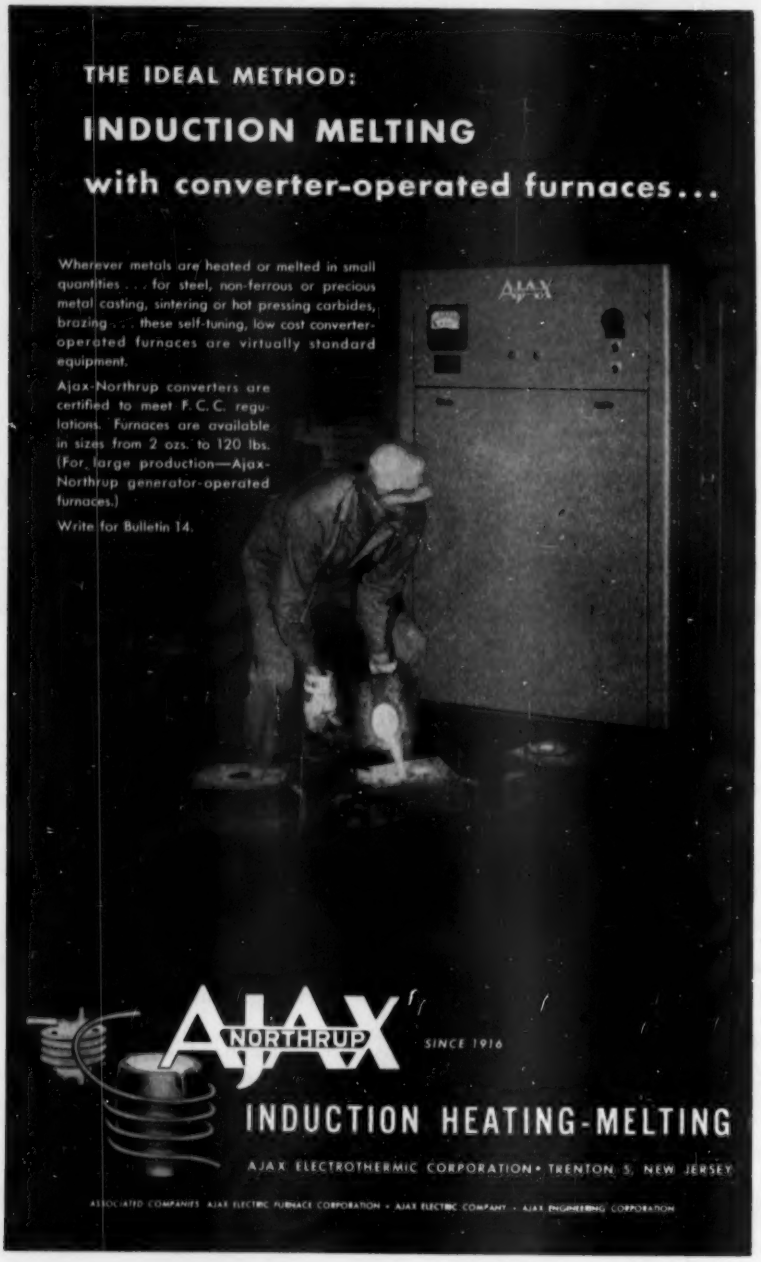
Continued on page 84

BOOKS

THE MEASUREMENT OF PARTICLE SIZE IN VERY FINE POWDERS, by H. E. Rose. The Chemical Publishing Co., Inc., 212 Fifth Ave., New York, N.Y. $2.75

The book is a compilation of four lectures given by the author at the University of London, King's College. The text deals with particle size measurement in general and covers methods that are applicable to a wide variety of powdered products. A wide variety of different apparatus is discussed with notes on the advantages and disadvantages.

The principle virtue of the book is that it brings together information and data that heretofore were somewhat scattered.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Wherever metals are heated or melted in small quantities . . . for steel, non-ferrous or precious metal casting, sintering or hot pressing carbides, brazing . . . these self-tuning, low cost converter-operated furnaces are virtually standard equipment.
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FUNDAMENTALS OF FRICTION AND LUBRICATION IN ENGINEERING — Published by the American Society of Lubrication Engineers, 84 East Randolph St., Chicago 1, Ill. Price $3.50.

The American Society of Lubrication Engineers announce that the Proceedings of their first National Symposium has just come off the press. This publication "Fundamentals of Friction and Lubrication in Engineering" contains 12 papers by world famous experts in their various fields. These papers, all published for the first time, include complete bibliographies with over 300 references.

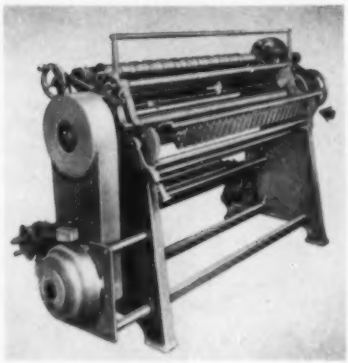
PROCEEDINGS, TENTH ANNUAL MEETING, METAL POWDER ASSOCIATION — Vol. I, General Session on Powder Metallurgy; Vol. II, Electronic Core Session; published by The Metal Powder Association, 420 Lexington Ave., New York. Price — Vol. I, $2.50; Vol. 2, $1.50.

Complete papers and transcript of discussions of the many powder metallurgy subjects presented at the 1954 meetings of M.P.A., are now available.

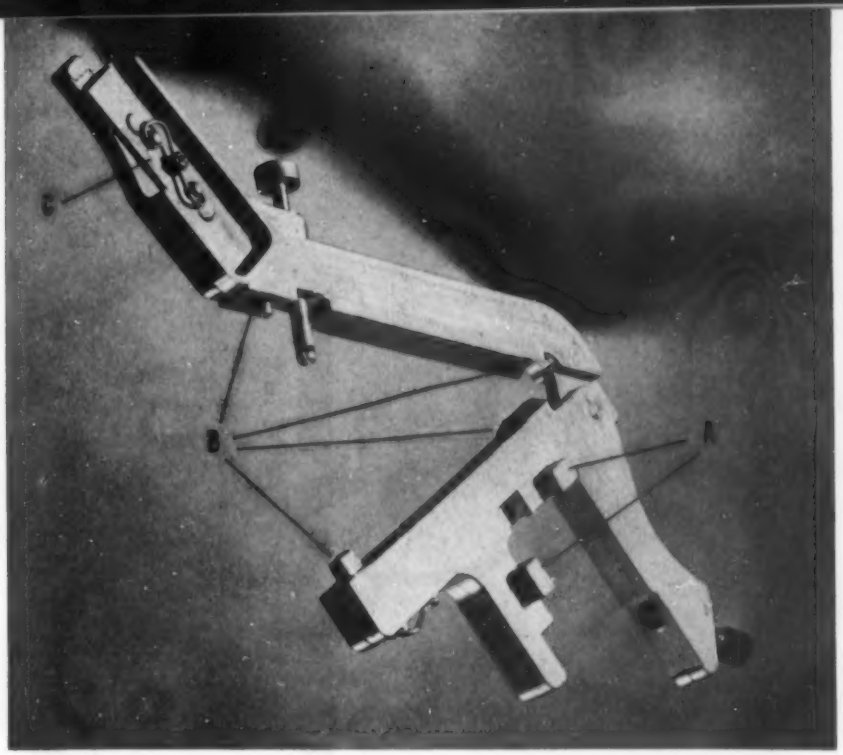
Following are subjects included: Vol. I—"Friction and Lubrication in Powder Metallurgy," "Lubrication Practices with Powder Metal Bearings," "The Non-Destructive Testing of Sintered Brass Parts," "Powder Metallurgy in the Automotive Industry," "Aircraft Applications for Powder Metallurgy," "Powder Metallurgy versus Other Precision Forming Methods," "The Manufacture of Sheet Metals from Metal Powder," "Carbide Flame Plating in Powder Metallurgy," "Semi-Formed Drawing Stock by Powder Metallurgy."

Vol. II—"Method of Determining Temperature Coefficient of Electronic Core Material," "Permeability Tuning, An Electronic Application of Iron Powder Cores," "The Application of Metal Powder Association Core Standards and Data Sheets," "Threaded Iron Cores: Uses and Applications".

DIE CASTINGS



1. A ROW OF RAZOR BLADES is held rigidly in accurate position to slit roll materials in this slitter and rewinder, above.



2. DIE CAST blade holder gets increased bearing surface from bosses (A); positive location of hinged members from mating forms (B); and accurate positioning of razor blade in recess (C).

This Company Found A Way To Get

Positive Register Between Hinged Components

CAN special-purpose machines make economical use of die castings? The Charles Beck Machine Corp. of Philadelphia says "Yes", having found that zinc die castings do a good job for them as razor blade holders in their slitting and rewinding machines.

These specialized machines slit rolls of such materials as cellophane, acetates, plastics, foil laminates and others, into predetermined widths, and then rewind them onto smaller rolls.

Slitters and rewinders are built with extreme precision, since the handling of roll materials presents special problems relating to tension of different materials, prevention of wrinkling in a fast-moving roll, precise spacing of slitting blades, and ability to replace blades without disturbing the machine setting.

An outstanding feature of these machines is the design of the razor blade holders, built of a pair of die castings. Although the function of this assembly appears to be quite simple, the complex shape of the two die castings reveals that a large number of functional refinements have been built-in.

In Figure 1 is a view of the machine, with an arrow indicating the location of blade holders along a square bar. Positioning of the blade holders along the bar must be simple and rapid, yet positive. Provision must be made for replacing blades quickly without changing the spacing.

The blade holder has been designed as a two-piece assembly with the upper portion holding the razor blade and the lower portion clamped firmly to the square bar. The two halves are hinged together so that the razor blade can be replaced in the upper portion without disturbing the careful positioning of the lower portion.

Since there are 16 of these blade holding assemblies per machine, the number of identical pieces of the blade holding assembly are great enough to justify tooling for die casting.

Design features of the blade holder

Greatest precaution has been taken to see that the blade holding assembly registers together positively and has adequate bearing surface on

Continued on page 85

The Symbol of Quality Zinc Die Castings And Superior Service

24 years of producing Zinc Die Castings exclusively for industry

The Schultz trademark is a symbol representing a 24-year reputation for expert craftsmanship, reliability, and integrity. It is your assurance that each casting is produced under strict metallurgical control to meet exacting specifications.

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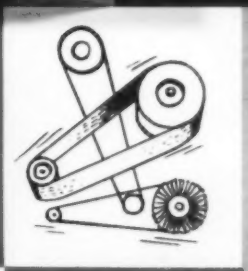
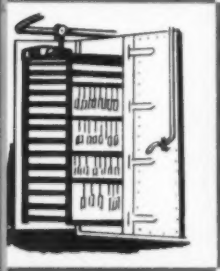
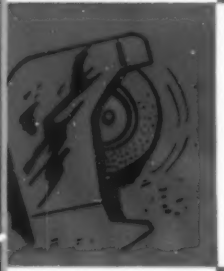
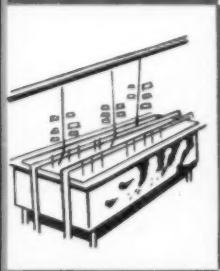
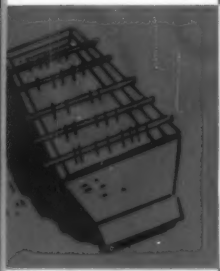
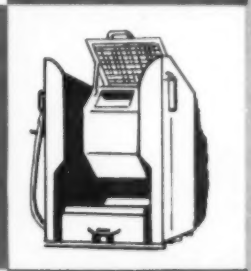





PMM

Finishing Section



Finishing includes all secondary operations performed on precision metal molded parts — up to and including final surface treatment. This section presents new information about the specialized methods, equipment and materials needed for finish-machining, assembly, surface preparation and final finishing of all precision metal molded parts.

devoted to the specialized problems of finishing . . .

DIE CASTINGS • INVESTMENT CASTINGS • PERMANENT MOLD CASTINGS • PLASTER MOLD CASTINGS • POWDER METAL PARTS • SHELL MOLD CASTINGS

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Better for metal where a thread cutting action supercedes thread forming. Type "1" Central Thread Cutting Screws drive with minimum torque to form a perfectly mated thread and a tight fit. Interchangeable with standard machine screws.

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Here the exclusive wide flute cutting slot combines with a specially spaced thread for low driving torque, high resistance to stripping and extra-free cutting action. Ideally suited to soft metals and plastics. Write for full details.

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Pointed and augur-like, the Central Type "A" Tapping screw pulls and forms thinner (.015" to .050") sheets of metal into a matching threaded section from punched, drilled, or nested holes. Available with slotted, Phillips, clutch or hexagon heads.

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Die-pointed and augur-like for thicker metal (.050" to .200"), Central Type "B" Tapping Screws pass through a hole in one piece, form their own threads to lock both parts securely. For porous castings, non-brittle plastics, fibre and asbestos materials.

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Recommended for general use in metals from .030" to .100" thickness. Standard pitch thread interchangeable with standard machine screws. Ideal for chip-free assemblies. Second assemblies can be made on projected end of the screw.

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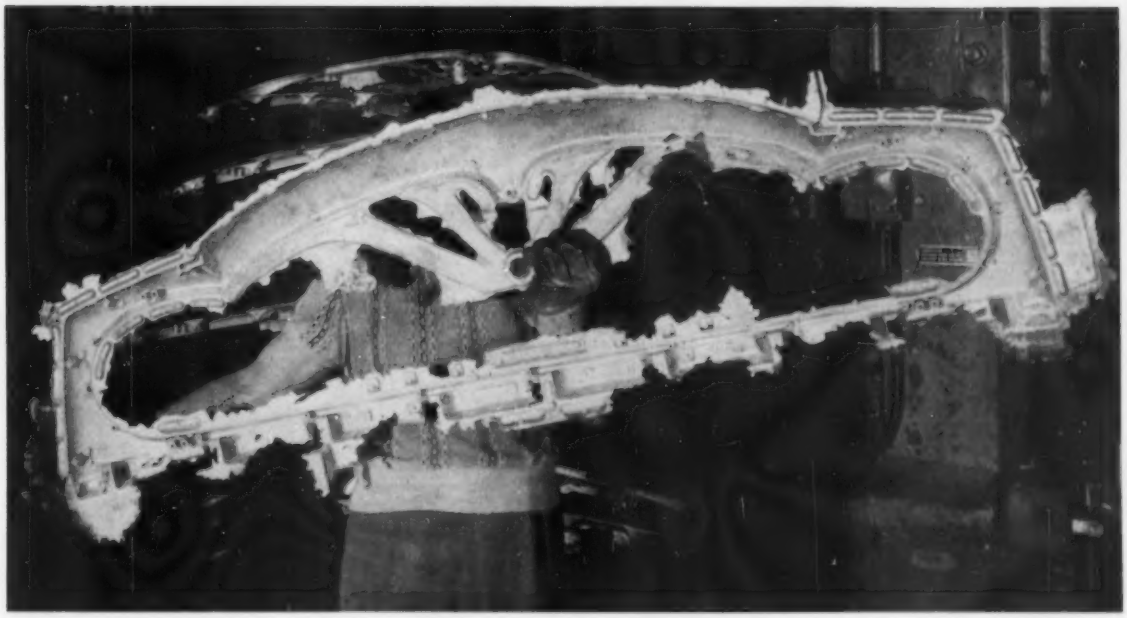
a PMM
photo story

From molten metal

to chromium plated grille . . .



The story of a casting

The radiator grille for a Packard car is die cast in zinc in one of these huge, 48-inch die casting machines. Then . . .

From Die Cavity To Plated Auto Trim

THE finishing of a die casting involves many more steps than the production of the casting itself. Die casting has been described as "the shortest distance between raw material and a finished part," but the achievement of a brilliant chromium plate such as that required for automotive trim, calls for many separate operations. A glimpse into trimming-polishing-buffing-cleaning-plating cycle is condensed in the following photo story.

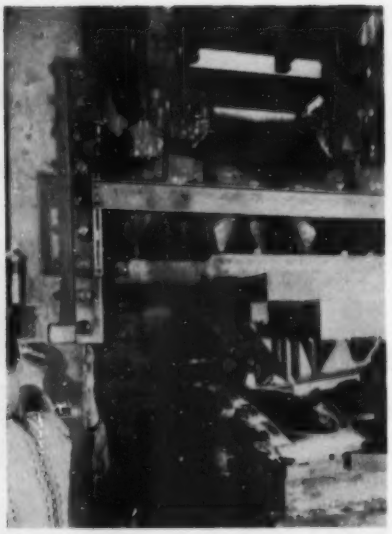
How A Grille Casting Moves Along The Finishing Line—Cont.

THE buyer of die castings sometimes applies the finish to the castings in his own plant, sometimes buys the casting already chromium plated. On the castings shown here, the large areas to be chromium plated are finished by the jobbing die caster, Doehler-Jarvis Div. of National Lead Co. for Packard Motor Car Company.

Some of the special, high-production polishing, buffing and plating equipment required to handle a large job such as this one, are illustrated on these pages.

Despite the installation of elaborate, multiple-station finishing machines that save much time, labor and cost, the complex contours of these grille die castings still require many manual finishing operations. Both types of operations are portrayed here.

. . . the rough grille castings are visually inspected for gross defects such as bad flow lines, cold shuts, etc. before . . .



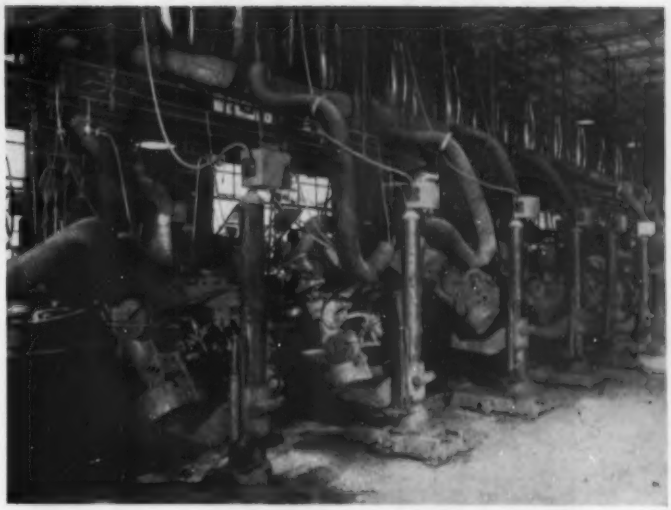
. . . trimming on automatic punch presses. Here residual gates, vents, and flash are removed leaving only a vestigial parting line. This . . .

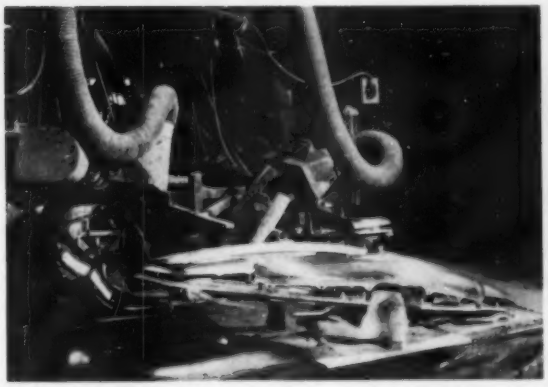
. . . parting line, on the inside of the casting is removed by a hand operation using a drum type sander, while . . .

. . . the external parting lines are polished off in a strapping operation using an abrasive belt which conforms to the grille contour. Now . . .

. . . the casting is loaded on a multiple punching machine which automatically clamps it in place and punches all of the holes in one operation, so that . . .

. . . the grille can be loaded on the table of a circulating buffing machine (above), where a multiple wheel set-up (right) automatically buffs the casting prior to plating. Each wheel along the multiple-station setup is adjusted to polish a different surface, either by means of a cammed motion of the work holder, or the angle and shape of the buffing wheel. To complete . . .





. . . the buffing cycle the castings are automatically switched from one side of the machine to the other to return to the loading and unloading station. But . . .

. . . before plating any recesses that can not be reached on an automatic machine must be buffed by hand to insure a satisfactory finishing job. To . . .

. . . insure good quality plate the castings must first be cleaned (above) and rinsed. First a copper plate followed by thorough cleaning and rinsing (above right) and then the balance of the plating cycle to produce the gleaming chromium finished Packard grille (lower right).

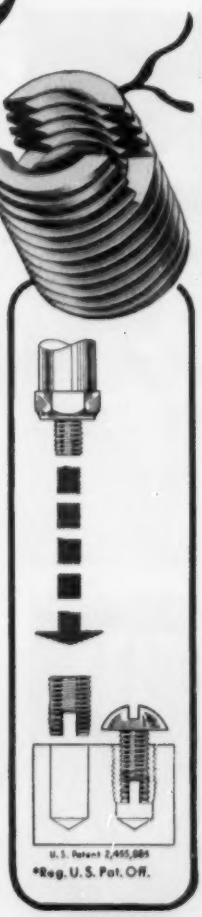
THREADED FASTENERS

need a firm grip, too!

Design engineers, generally, recognize that light metals, plastics and many of the other newer structural materials require some sort of hard bushing as a foundation for tapped threads. Ignoring this sound principle often leads to the development of an "Achilles' Heel" in an otherwise well-designed product. Customer reaction to such a weakness sometimes causes a marked drop in sales.

Of all the types of bushings designed for this purpose, the TAP-LOK INSERT* possesses distinctive advantages that have earned it a leading position in this field. Since it is self-tapping, the TAP-LOK INSERT eliminates the separate tapping operation required with other types of bushings. No tedious hole preparation is needed. Crossing of threads while inserting these inserts is impossible. No secondary staking operation is required. A simple driving tool with a hardened threaded shoulder stud engages the internal thread of the TAP-LOK INSERT and forces it to tap its way into a cored or drilled hole equal in size to a tap drill hole for its external thread.

The insert retains its seat firmly against vibration. It provides maximum torque-and-pull resistance. It is not subject to the time-consuming failures of molded-in and cast-in inserts. TAP-LOK INSERTS are widely used as original equipment, for salvage, and for repair of stripped threads.



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This commemorative medal was issued, and miniature bronze replicas given to company employees, as . . .

PANGBORN CORP. CELEBRATES GOLDEN ANNIVERSARY

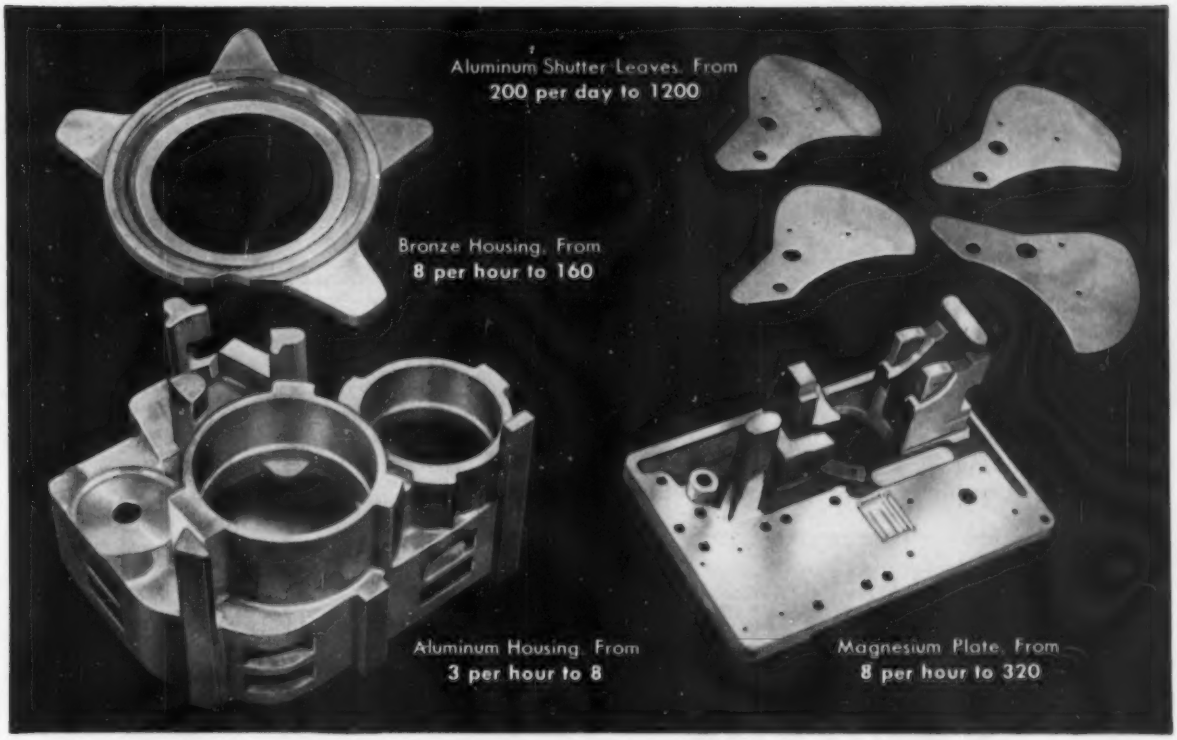
Pangborn Corporation's appropriate theme-slogan "Fifty Years Partnership With Industry" keynoted the Golden Anniversary activities of the Maryland manufacturer of blast cleaning and dust control equipment held September 1 and 2 at the home plant in Hagerstown.

A unique aspect of the event was the participation of Thomas W. Pangborn, the firm's founder who after 50 years as president still continues in active management of the corporation.

Following Open House, a tribute program was held on the lawn in front of the Pangborn plant. At this time the employees unveiled a bronze plaque honoring the achievements of Thomas W. Pangborn and his brother John C. Pangborn, and serving as a permanent memorial of the occasion.

John C. Pangborn, first vice president, then presented Howard L. Easton (whose 40 years service makes him the senior shop employee) with a replica of the Golden Anniversary commemorative medal as a token of the keepsake awarded to all employees on the following day.

Theodore R. McKeldin, Governor of Maryland, spoke briefly and presented the official tribute of the State of Maryland. Robert G. Merrick, president of Equitable Trust Company, Baltimore, and Rev. Theodore M. Hesburgh, president of Notre Dame University also addressed the large crowd in attendance.


Aluminum Shutter Leaves. From
200 per day to 1200
Bronze Housing. From
8 per hour to 160
Aluminum Housing. From
3 per hour to 8
Magnesium Plate. From
8 per hour to 320

Camera Maker finds...

HONITE Barrel Finishing Saves $25,000 in 3 Months!

Fairchild Camera and Instrument Corp., Syosset, N.Y., cut finishing time on a variety of parts up to 3900% when they switched to the HONITE Barrel Finishing Method. And the savings thus effected paid for $25,000 worth of barrel finishing equipment in just 3 months!

The parts shown above were formerly deburred and finished by hand—a slow, costly job. Now, with the HONITE Barrel Finishing Method costs have been cut to the bone, with better, more consistent finishes. The company deburrs and finishes an average of 150 different lots of parts a week—has found that HONITE Barrel Finishing Methods will do a perfect job on everything from tiny washers and hair-thin shutter leaves to 32-pound bull gears, and even on pieces with tolerances of less than .0002"!

Your HONITE Sales Engineer or nearby HONITE distributor will show you how *you* can increase production and cut costs, too. Call him today!

Honite BRAND

MINNESOTA MINING AND MFG. CO.
Dept. PM-174, St. Paul 6, Minn.

- ☐ Send me complete printed story on Fairchild Camera operation
- ☐ Send me free copy of "3M Barrel Finishing" Manual
- ☐ I'd like to talk with a HONITE Sales Engineer

Name..... Title.....

Company.....

Address.....

City..... Zone.... State.....

Type of product to be finished.....

3M COMPANY

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: London, Ont., Can. Export: 122 E. 42nd St., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

For more information circle No. 89 on the Reader Service Card

Oakite Products Open New Laboratories For Research, Development

John A. Carter, president of Oakite, surrounded by members of the company's research and product development staff, pulls a switch to open the new laboratory facilities.

The new and expanded laboratories of Oakite Products, Inc., were introduced recently when the company invited a large group of guests to tour and inspect the new facilities for research and product development in chemical cleaning.

John A. Carter, president of Oakite, and J. J. Basch, manager of research and product development, were on hand to welcome the visitors to the 30,000 square feet of laboratories, located on a single floor at 350 Hudson St., New York City.

The labs are subdivided into three major sections — product development, customer service and engineering. In addition a complete pilot plant is planned for the small scale manufacture of detergents and solvents prior to field testing.

Of particular interest to the metal cleaning industry are the departments concerned with conversion coatings, barrel finishing and surface cleaning. One of the special laboratories is an actual, small-scale plating shop in which tests are conducted on pieces plated under different conditions, and following electrocleaning in various solutions.

Cutaway view shows floorplan of Oakite's new 30,000 square feet of laboratory space.

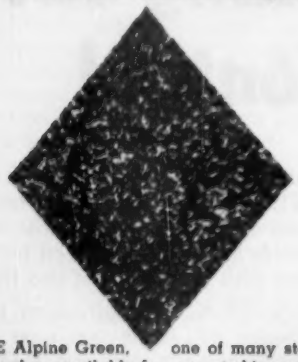
The customer service lab, which handles an average of 1500 requests a year for technical advice and study, revealed a wide assortment of equipment used to simulate customers' actual production methods: 2-, 4- and 5-stage automatic washing machines, complete electroplating line, various barrel burnishing and finishing equipment, salt spray chambers, humidifying cabinet, and other specialized equipment are on hand.

THE MOST AMAZING FINISH DEVELOPMENT IN 100 YEARS!

COLOR-FLECKED PLEXTONE®

SINCE 1876 (Mfd. under U. S. Pat. No. 2591904)

Imagine—a textured and MULTI-COLORED finish—sprayed at ONE time, from ONE gun, in ONE coat that covers surface flaws and blemishes completely!



PLEXTONE Alpine Green, one of many standard pre-mixed colors available for prompt shipment. Also available in solid colors and in custom multicolors.

CAPSULE FACTS

COLOR-FLECKED PLEXTONE is a new industrial finish in which colors exist separately until sprayed, when they interlace as shown above.

CHARACTERISTICS

Lacquer base • Air dries approx. 30 minutes — dries hard 2 to 3 hours • Available in flat or semi-gloss • Good chemical resistance • Exceptional hiding power • Does not stain • Resists wear, chipping, cracking • Can be scrubbed, even scoured • Can be touched up without showing • Thicker film hides surface imperfections, covers porous materials • Available in non-toxic grades • Bonds readily to wood, wallboard, paper, cement, plaster, phenolic impregnated papier-mache forms, plastics, woven fabrics, and metals such as cast iron, steel, aluminum, brass, copper.

PLEXTONE—CUTS FINISHING COSTS UP TO 35%

Eliminates much costly pre-finishing, hides surface flaws. Usually only one prime, one PLEXTONE coat required!

PLEXTONE — UNBELIEVABLY RUGGED!

Color flecks go "thru-the-film," resist abuse, defy alcohol, grease, oil. Can be washed, scoured, without damage!

PLEXTONE — SALES APPEAL OF *MULTICOLOR!*

Endless new effects of 2, 3 or more colors sprayed from one gun, at one time . . . tone-on-tone, spatter-dash, etc., etc.

PROVE IT TO YOURSELF—MAIL COUPON TODAY

MAAS & WALDSTEIN CO.

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Midwest Division: 1658 Carroll Ave., Chicago 12, Ill.

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PIONEERS IN PROTECTION

PLEXTONE®

MAAS AND WALDSTEIN CO., PLEXTONE Division
2118 McCarter Highway, Newark 4, New Jersey

Gentlemen: Please send me FREE color chips, PLEXTONE sample, and application data.
I am particularly interested in PLEXTONE for finishing

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

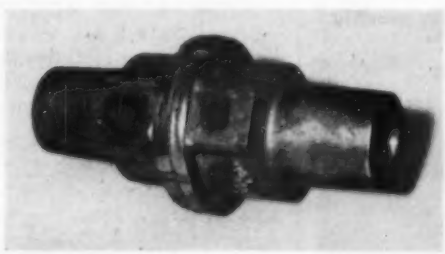
For more information circle No. 87 on the Reader Service Card

This is the equipment used for fluxless, ultrasonic soldering.

Three Ways To Use Ultrasonic Soldering On Aluminum Die Castings

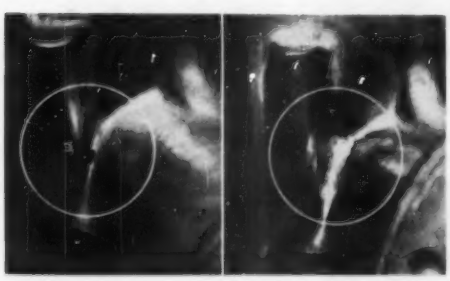
For Permanent, Hermetic Assemblies

These two die castings give a tight enclosure when soldered together, right.



For Complex Shapes From Simple Castings

Complicated core housing is made possible by butt soldering two die castings.



For Salvaging Defective Castings

Before and after view shows small blowhole repaired by soldering.

SOLDERING aluminum without a flux by means of a newly developed process opens up new uses for aluminum die castings. The process, which employs ultrasonic vibration to penetrate the aluminum oxide coating, is called Sonobond by Aeroprojects, Inc., of West Chester, Pa., manufacturers of the equipment.

This technique suggests new design possibilities for aluminum die castings. Where formerly a single, complicated die casting was required, now two or more simple die castings can be joined together. Difficult shapes involved undercuts and other features that are difficult or impossible to die cast can now be produced by permanently joining two or more die castings.

The process is said to have certain advantages over welding of aluminum die castings. In welding, the metal is heated momentarily to a plastic or molten state. If small pockets of compressed gases are present in the metal, particularly in thicker sections, this heating allows them to expand and distort the casting.

In soldering, on the contrary, the heat is required only to melt the solder and not the die casting, thus permitting strong, continuous joints to be made.

Since no flux is required for the ultrasonic process of soldering, hermetic seals of die cast parts are reported to be entirely practical without danger of contamination from the flux.

The problem which conventional soldering presents . . . the presence of a hard coating of aluminum oxide on the surface . . . is solved by this newer technique. Sonobond consists of two parts: the generator transforms ordinary 110 volt alternating current into high frequency electric energy. The soldering head converts this electric energy into ultrasonic energy which is delivered through a coupler to the soldering tip and thus to the melted solder. Violent action of the ultrasonic vibrations shatters he oxide coating on the aluminum and allows the solder to alloy with the clean aluminum surface.

Although soldering of aluminum is the most striking application for this process, its manu-

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There are other brands of materials that resemble Roto-Finish chips and compounds . . . but only Roto-Finish chips and compounds give you the *extra advantage* of continuous research by the company who originated the Roto-Finish processes. Roto-Finish chips and compounds are carefully manufactured so *you* obtain the best results on *your specific job*. To obtain the best results at the lowest cost . . . insist on ROTO-FINISH chips and compounds.

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SAVES MAN HOURS AND MONEY by eliminating hand finishing.
GIVES ABSOLUTE UNIFORMITY...in any quantity.
MAINTAINS PRECISION TOLERANCES.
CUTS FINISHING costs as much as 80%.
LOWERS INITIAL and MAINTENANCE costs.

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Put the experience and facilities of Roto-Finish to work for you on *your special finishing problems.*

Send a few unfinished parts to us . . . plus a finished part as a guide. We *guarantee* that you will get the same results in your plant that we produce in our laboratory. There's no obligation.

Write for fact-packed Roto-Finish catalog for complete information.

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For more information circle No. 94 on the Reader Service Card

Soldering Aluminum — Cont.

facturers report that it works equally well in joining such other metals as copper, magnesium, silver and brass, or in soldering dissimilar metals such as aluminum to copper. Sheet, extrusions, tubing, wire, sand castings and other types of precision aluminum castings can also be handled, as well as die castings.

The equipment for ultrasonic soldering is available in various models, depending upon the type of work to be done: small, hand model, standard floor model or special production models engineered for specific production jobs. Although standard equipment is available, some jobs, such as those involving complex configurations of die castings, may require specially designed soldering tips. Other jobs may require special units designed for high rate of production speed.

WAGNER BROS. IN NEW PLANT

Wagner Brothers, Inc., manufacturers of metal finishing equipment and supplies, have consolidated all equipment manufacturing facilities in a new plant at 7800 Dix Rd., Detroit, according to Fred Wagner, sales manager.

Manufacturing operations formerly carried on at several smaller, separate locations in Wayne and Detroit will now be done at the Dix Rd. plant.

The plant has over 30,000 square feet of manufacturing area on the ground floor with additional space for engineering and estimating departments and a well-equipped electrical research laboratory.

Wagner Brothers' main office is still located at 404 Midland Ave., Detroit 3, Michigan.

(Advertisement)

A SPECIAL REPORT ON PROTECTIVE FINISHES FOR ALUMINUM

Most aluminum producers and fabricators are well aware of the superiority of chemical finishes over anodizing for the protection of aluminum from corrosion. Naturally, then, there is a running battle for acceptance among the leading producers of the protective chemical finishes.

That's why, here at Allied, we have always studied your needs with regard to both our own and competitive processes. We're constantly trying to produce new and better finishes because we believe there's always room for improvement . . . even to our own products. Some years ago this policy led to the introduction of a process, long in development, that offered you a way to overcome anodizing's obvious technical complications . . . Iridite #14. This finish was far easier to use than anodizing, yet provided comparable, if not superior, quality. And, its cost was much less than anodizing.

But other finishes offering similar advantages over anodizing have entered the market. So . . . the current battle for acceptance. By any cost comparison Iridite #14 is the most economical. However, corrosion tests by users show contradictory results as to performance from Iridite #14 and other leading protective finishes for aluminum. Most tests show Iridite #14 superior, but some do not. The margin of difference, however, is always small. The truth is that all have proved good. However, our laboratory research indicated that still further improvements could be made.

That knowledge . . . plus our aim to give you even better protection and maintain the leadership of the industry, is exactly why Allied Development Engineers have been working for long years to develop a better finish than any of those now available, including our own Iridite #14.

Now the new finish is ready for you. It's called Iridite #14-2 (Al-Coat).

From a performance standpoint, Iridite #14-2 gives you two important advantages in the protective finishing of aluminum.

FIRST: in its fully colored brown film stage it provides corrosion resistance decidedly superior to previous processes.

SECOND: the basic brown film can be hot water bleached to produce a clear-type film with protection heretofore unobtainable from clear-type chemical finishes.

From an operating standpoint, new Iridite #14-2 gives you three important advantages.

FIRST: it provides consistently higher corrosion resistance for different aluminum alloys treated in the same bath.

SECOND: it provides a more uniform appearance for parts of different alloys and with varied surface finishes before treatment.

THIRD: its operating and technical characteristics are superior to those of other processes.

If you are using or planning to use a chemical finish for aluminum, you should have full details on new Iridite #14-2. Write us or send samples for free test processing. Or, for more immediate advice, call your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book. - - - ALLIED RESEARCH PRODUCTS, INC., 4004-06 EAST MONUMENT STREET, BALTIMORE 5, MARYLAND.

P. S. Even new Iridite #14-2 will be constantly measured against both your needs and competitive processes to make sure you get the best possible, most economical finish for your product that man and the laboratory can develop.

For more information circle No. 81 on the Reader Service Card

Product Facts

Catalogs · Manuals · Brochures

PROCESSES

Powdered Metal Parts: 144

A new brochure has been issued by Detroit Sintered Metals Corp. listing the metal specifications for sleeve bearings, bushings and intricate shapes manufactured by powder metallurgy. Included in the brochure are typical sizes and tolerances for bearings and bushings and technical data on civilian and armed forces specifications that this company's products will meet.

Metallic Friction Materials: 145

A 44-page booklet has been issued by Raybestos-Manhattan, Inc. covering the full line of friction materials made by that company. Included is a large section on sintered metallic friction materials and numerous charts, tables, and drawings giving design and application data. Engineering specifications are included.

Vacuum Die Castings: 146

The advantages and applications of vacuum die cast aluminum bronze are discussed and illustrated in a brochure that has been published by the Aurora Metal Co. Physical and chemical properties of the as-cast metal are given.

Zinc & Aluminum Die Castings: 147

The complete facilities, including die making, metal alloying, casting and final machining, available at National Die Casting Co. are fully described in a brochure available from the company. The chemistry of a wide range of alloy compositions to meet all probable specifications is given.

Technical Data Book: 148

A comprehensive booklet has been published by Chicago White Metal Products, Inc. on die casting and die cast parts. Included are tables giving such data as dimensional limits for die castings, mechanical and physical properties, casting characteristics, costs, properties of die casting alloys, compositions and a chart comparing die castings with other fabricating methods.

Permanent Mold Castings: 149

The advantages, applications and limitations of the permanent mold process are thoroughly discussed in a brochure issued by Michigan Wheel Company.

The Die Casting Process: 150

The die casting process from molten metal to finished part is completely, though briefly, described in a 25-page booklet issued by the American Die Casting Institute. Included are the chemistry and properties of zinc, aluminum and magnesium die castable alloys.

MATERIALS AND EQUIPMENT

Aluminum Alloy Applications: 155

The Technical Advisor, house organ of the Reynolds Metals Co. is devoted to the application of aluminum and aluminum alloys. Fabrication, finishing, and properties are comprehensively discussed in this monthly bulletin.

Shell Mold Making Equipment: 156

The shell molding process and a complete description of the machines for making the molds is given in a publication of the Polygram Casting Co., Ltd.

Alloy Data Sheets: 157

A compilation of data sheets listing the composition, properties, heat treatment and applications of 14 castable, corrosion resistant alloys has been prepared by the Alloy Casting Institute.

Tungsten & Molybdenum: 158

A new 24-page booklet has been issued by Fansteel Metallurgical Corp. covering the frabrication, chemical and physical properties, uses and applications and available forms of tungsten and molybdenum.

Free Machining Tool Steel: 159

A brochure from Vanadium-Alloys Steel Co. describes the line of free machining tool steels made by that company. Six high speed steels and three die steels are discussed.

Deep Throat Power Presses: 160

Catalogs giving complete descriptions and specifications of two deep-throat, rigid-rib punch presses are available from Kenco Mfg. Co. The two models are 4 and 5-ton capacity, designed for bench or floor installation.

To get copies of any item listed here, simply circle the appropriate number on Reader Service Card bound into this issue.

Carbon Atmosphere Control: 161
In a ten page catalog, the Leeds & Northrup Co. describes its equipment for the measurement and control of the carbon content of furnace atmospheres, particularly the company's homocarb furnaces.

Industrial Rubber Products: 162
A bulletin on Surety Rubber Co's. Sureseal synthetic for industrial gloves and other protective apparel has just been released.

Mold Heating Furnaces: 163
Furnaces specifically designed for melting out the pattern in investment casting and subsequently heating the molds to casting temperature are described in a recent issue of the Heat Treat Review published by Surface Combustion Corp.

FINISHING

Assessment of Surface Finish: 166
A ten page booklet explains optical methods for testing surfaces of materials, including metals, plastics, glass, etc. The booklet describes accurate and convenient methods for the examination and assessment of surface finish. Copies are available from William J. Hacker & Co., Inc.

Continued on page 70

18 WAYS TO SAVE TIME & MONEY!
with the
Mead Industrial Burring Machine

Screw Machine Cam
Grind Edges to Smooth Fair Curves
Steel Shaft
Remove Nib Left by Cut Off Tool
Die Cast Cap
Remove Flash Between Bosses

WOOD-PLASTIC-METAL

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All Trades" machine. Your burring can be done in "free time"—install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.

MEAD SPECIALTIES COMPANY
4114 No. Knox Ave. Dept. DC-114 Chicago 41, Ill.

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Which of these jobs gives you trouble?

Oakite has 5 new ways to help you

Oakite chemists have developed efficient new materials for the 5 important jobs listed below. One of these new materials may provide the perfect solution for your most difficult problem.

1 **HEAVY-DUTY CLEANING IN TANKS:** New material combines the best qualities of alkaline and solvent cleaners.

2 **PHOSPHATE COATINGS:** One material cleans steel while applying dense iron-phosphate coating. Another surpasses government specifications for heavy zinc-phosphate coatings. Lasting paint adhesion, protection against corrosion, ease of control.

3 **ETCH-CLEANING ALUMINUM:** Uniform etching in preparation for anodizing or painting. Scaling and sludging minimized or eliminated.

4 **ELECTROCLEANING BRASS:** Efficient, economical cleaning without danger of tarnish.

5 **INHIBITING PICKLE BATHS:** Liquid inhibitor for sulphuric, hydrochloric and phosphoric acids. Saves steel, saves acid, builds own foam blanket to suppress pickling fumes. Easy to add to continuous strip or batch pickling operations.

FREE

Circle the coupon number corresponding to the job that gives you trouble. We'll send information about the new material for the work, also our 44-page illustrated booklet "Some good things to know about Metal Cleaning."

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.,
34G Rector St., New York 6, N. Y.

Send me a FREE copy of "Some good things to know about Metal Cleaning" and tell me more about the new Oakite material for the job (jobs) corresponding to the number (numbers) I've circled below.

1 2 3 4 5

Name_____

Company_____

Address_____

For more information circle No. 92 on the Reader Service Card

Foremost in Quality . . .

Sel-Rex

Completely Sealed

SELENIUM RECTIFIERS

If a manufacturer intends to maintain a prominent position in a highly competitive business, his production equipment must be the most modern and efficient made.

SEL-REX places no limitation on engineering to achieve the finest DC power plant . . . nor compromise in the choice of component parts to "bring the cost down." True, such a policy may reflect a slightly higher initial cost . . . but in the long run a SEL-REX UNIT is the most economical. There are no moving parts to wear out — no maintenance expense, no loss of production.

SEL-REX RECTIFIERS available for every requirement from 25 to 50,000 amperes including completely sealed water cooled and air cooled models.

Write for complete details.

NEMA

BART-MESSING CORPORATION
Dept. PM-11, 229 Main Street, Belleville 9, N. J.

For more information circle No. 83 on the Reader Service Card

Blast Cleaning: **167**
A new catalog issued by the Pangborn Corp. fully describes the complete line of Blastmaster barrels from the smallest, 1½ cu. ft., to the largest, 27 cu. ft. Included is information on dust control equipment and specific application, installation, and operation data.

New Finishing Lathe: **168**
A new, medium duty, polishing and buffing lathe is described in literature available from the Hammond Machinery Builders, Inc.

Surface Grinding: **169**
Tips on avoiding and correcting common faults in surface grinding are given in an article in the latest edition of Grits and Grinds, published by the Norton Co.

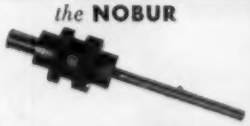
Diamond Compound: **170**
Precision Supply & Machinery Co. has a new specification chart and price list of diamond compounds for all types of finishing operations from coarse cutting to super finishing.

Non-Flammable Cleaner: **171**
E. F. Houghton & Co. has developed an emulsion type metal cleaner that is used at room temperatures. Described as being a water base material, hence non-flammable, the new cleaner is described in technical data sheets available from the company.

First and Foremost

NOBUR'S *Job Tested* **TEAM** *for*
★ **DEBURRING**
★ **CHAMFERING**

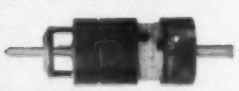
the **NOBUR**



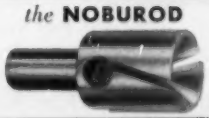
for machine deburring and chamfering of line-drilled and otherwise inaccessible hole surfaces.

for the automatic deburring and chamfering of front and back hole faces simultaneously in sheet metal, etc.

the **NOBURMATIC**



the **NOBUROD**



for rapid deburring and chamfering the outer ends of rods, tubes and bosses.

for rapid deburring and chamfering openly accessible hole faces.

the **NOBURSINK**

NO/BUR TOOLS **NOBUR MANUFACTURING CO.**
717 No. Victory Boulevard, Burbank, California

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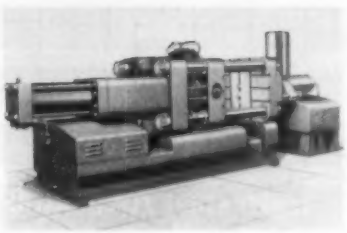
New Products ... the Reader Service Cards will bring full details



DIE CASTING MACHINE
. . . with advanced design

A new line of cold chamber die casting machines, featuring a new clamp design and new advanced design injection ends, has been introduced by H-P-M.

The new clamp offers a combination of hydraulics, for smooth, precisely controlled movements and transmission of energy, with a simple mechanical linkage and wedge for multiplication of power, resulting in the storage of potential energy.

Maintenance on the mechanics in the clamp is said to be virtually nil because there are no toggle pins to shear, no single line bearing contacts, and no highly stressed members under heavy loads.

The new injection end is a compact, self-contained unit comprising a complete package power unit, including pump, motor and reservoir. Compactness of this unit greatly reduces line breaks or leaks leading to safer cleaner operations.

Hydraulic Press Mfg. Co.
For more information, circle No. 196 on the Reader Service Card

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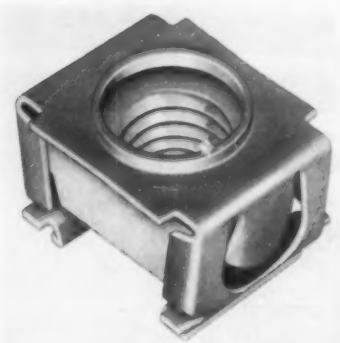

SPEED FASTENER
. . . is self-anchoring

A new fastener's outstanding feature is the ease with which it is slipped into a panel hole and anchor-locked in position. Once installed, it is said to be impossible to rotate the nut or drive it out of its spring steel enclosure. The unit is a T-shaped nut, made of high grade steel and preassembled into a spring steel retaining cage.

Assembly of the fastener is accomplished by placing in a panel hole by hand and pressing to lock in the screw-receiving position with a simple hand tool. Welding, clinching, staking or other operations are unnecessary.

Designed to withstand excessive amounts of torque, the new self-anchoring nuts are recommended for applications where fasteners are in danger of being lost due to stacking, butting or rough handling of sub-assemblies on the production line.

The new nut can be attached after any finishing process, thereby eliminating retapping or masking operations.

Tinnerman Products, Inc.
For more information, circle No. 197 on the Reader Service Card

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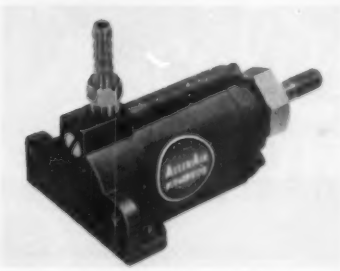


AIR CLAMP
. . . has spring return

Announcement of a spring return air clamp has been made by one manufacturer.

This clamp of 1⅛ bore (1 sq. in. area) and 1 in. stroke, features cast bosses for either horizontal or vertical mounting as well as a threaded nose piece. The piston rod is of stainless steel and is threaded on the front end. An "O" ring is used to seal the piston.

A. K. Allen Co.
For more information, circle No. 205 on the Reader Service Card

Continued on page 73

Equipment for more profitable plating

now offered by UNITED CHROMIUM

UNICHROME
Trade Mark

You've long known United Chromium for its leading role in plating developments and its technical aid to metal finishers. Now, United Chromium also supplies equipment for general plating . . . offering you the benefit of over 25 years close working experience with plating plant needs. When you work with United Chromium, you can be sure your equipment is designed for efficiency and economy.

- TANKS
- BLOWERS
- HEATING COILS
- TEMPERATURE CONTROLLERS
- RECTIFIERS
- ANODES
- FILTERS
- TANTALUM HEAT EXCHANGERS
- PUMPS
- AIR AGITATORS
- AND MORE

TWO EXAMPLES OF WHAT SUCH EQUIPMENT CAN MEAN TO YOU

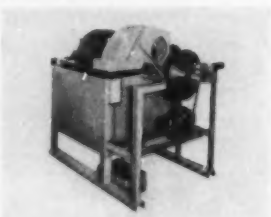
Unichrome ROUND anode cuts chromium plating costs

This cylindrical anode innovation by United Chromium has a simple, rugged design that improves operating efficiency, saves money. Here's how:

- Longer service life through less corrosion.
- Greater anode activity—gives better current distribution and fewer plating rejects.
- Greater rigidity—stops warping.

Unichrome plating barrel speeds work saves money in small parts plating

Small work can get a high quality, bright chromium deposit within 10 minutes in this 24" diameter barrel. It does a whole batch at a time—without contact marks, burning or missing. Hard plating, too.



Ask us to submit a proposal on your needs.

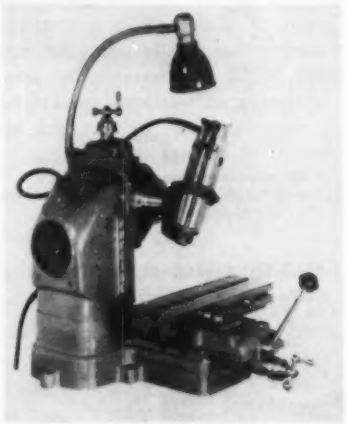
UNITED CHROMIUM, INCORPORATED

100 East 42nd St., New York 17, N. Y.

Detroit 20, Mich. • Waterbury 20, Conn. • Chicago 4, Ill. • Los Angeles 13, Calif. • In Canada: United Chromium Limited, Toronto 1, Ont.

For more information circle No. 95 on the Reader Service Card

BENCH MILL
. . . designed for midget mills



A new, bench milling machine designed for second operations on small parts of metal or plastic features a high speed, 45,000 RPM, tool drive, especially suited for the efficient use of cemented carbide midget mills. The quill speed is adjustable from 10,000 to 45,000 RPM with a full ¼ HP delivered at all speeds.

Overall design of the machine is extremely rigid to provide for maximum accuracy of work.

Precise Products Corp.
For more information, circle No. 210 on the Reader Service Card

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MICRO-DRILLS
. . . for small holes

The Sphinx brand of precision small drills are now being distributed in this country.

These drills, of high speed steel, start at 0.08 mm (0.003 in.) diameter and come in increments of 0.01 mm. They are available in either straight or spiral flutes.

Because of their rigidity, the drills are used on automatic machines and for all types of work where accurate and straight holes are required. The drills are made with oversize ground shanks.

Louis Levin & Son, Inc.
For more information, circle No. 209 on the Reader Service Card

Circle No. 53 on the Reader Service Card

YOUR
"ALL-IN-ONE" SOURCE
for PERMANENT MOLD
CASTINGS in ALUMINUM

We offer complete service on aluminum permanent mold castings. We also have complete foundry facilities for sand casting aluminum, brass and bronze.

Heat Treating Facilities for Aluminum Alloys

Design assistance or consulting engineering service on your casting problems.

Write for information, or send your prints for quotations

Mansfield Brass & Aluminum Corporation
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ALMCO
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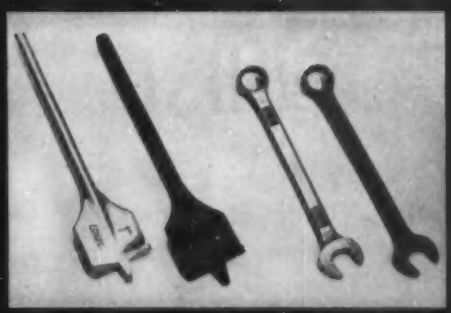
SPEED FINISHING
ALBERT LEA, MINN.



BARREL
FINISHING
Descaling
COMPOUNDS

Recognized as the finest available, Supersheen offers a wide variety of *Descaling Compounds* that are "tailored to fit" your specific requirements. They provide, with various types of abrasive chips, accurately controlled processing — they produce clean surfaces and true colors,— they are economical — and achieve consistently superior results.

Send today for complete details of Almco Supersheen Compounds. Over 40 different standard types.

ALMCO Supersheen
AMERICA'S LARGEST MANUFACTURER OF ADVANCED BARREL FINISHING EQUIPMENT – MATERIALS AND COMPOUNDS
ALBERT LEA, MINNESOTA

For more information circle No. 82 on the Reader Service Card

DEPRESSED CENTER DISC
. . . for rough grinding

A new depressed center abrasive disc for rough grinding, combining increased cutting ability and safety, has been announced.

Called the Type "G", the disc is made of aluminum oxide in a reinforced fabric-resin construction. It is designed for heavy weld removal, slotting and portable cutoff operations. Both sides and the periphery of the disc can be used for cutting.

The new disc is available in grit 24 in two sizes, 7 and 9⅛ in. diameters, in "R" gardness. A speed of 5500 RPM is recommended for the larger size and 6000 RPM for the smaller size.

Other specifications include a ⅞ in. diameter arbor and an overall thickness of ¼ in.

Minnesota Mining & Mfg. Co.
For more information, circle No. 200 on the Reader Service Card

SAND COATING MACHINE
. . . for shell molding

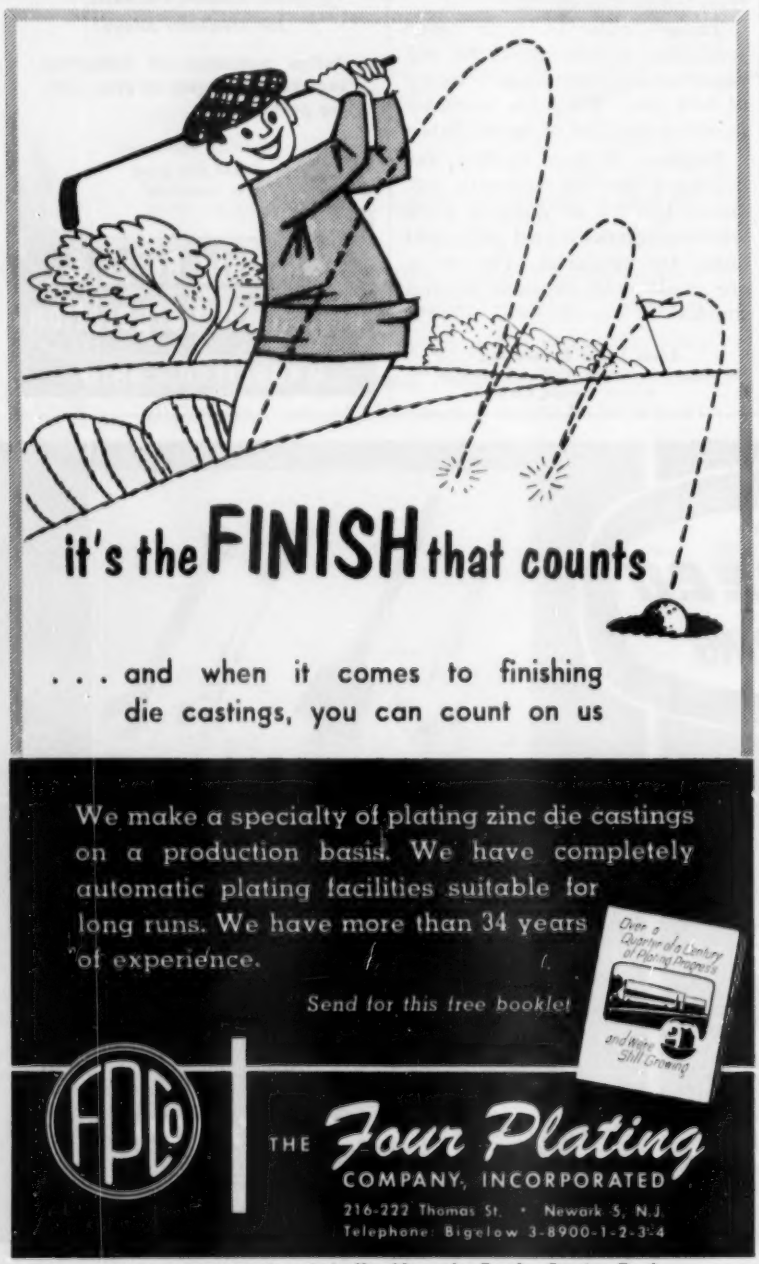
A new machine called the Mulbaro, has been introduced for applying a resin coating to sand for shell molding. This low-cost machine is reported by the manufacturer to bring the resin-coating process within reach of modest budgets.

Coated mixes are said to require up to 50 percent less resin for shells of comparable strength, and may be stored without deterioration. There is no dust or explosion hazard. The machine uses either wet or dry mixing.

Beardsley & Piper Div.
Pettibone Mulliken Corp.
For more information, circle No. 204 on the Reader Service Card

AUTOMATIC PLATING
. . . in side arm machine

A fully automatic, side arm type of electroplating machine has been announced. The new line of machines will supplement the existing line of automatic rack and barrel type of plating and processing equipment.


it's the FINISH that counts
. . . and when it comes to finishing die castings, you can count on us
We make a specialty of plating zinc die castings on a production basis. We have completely automatic plating facilities suitable for long runs. We have more than 34 years of experience.
Send for this free booklet
Over a Quarter of a Century of Plating Progress
and We're Still Growing
FPCo
THE Four Plating COMPANY, INCORPORATED
216-222 Thomas St. • Newark 5, N.J.
Telephone: Bigelow 3-8900-1-2-3-4
For more information circle No. 85 on the Reader Service Card

The new machine is designed for low head room and high lift. The equipment incorporates a delayed set down method and incorporates new safety features. The transfer method is entirely new and provides for automatic loading and unloading.

In designing the new machine the engineers took into account the modern methods of automatic materials handling.

Frederic B. Stevens, Inc.
For more information, circle No. 201 on the Reader Service Card

HIGH TEMPERATURE FURNACE . . . bright brazes stainless

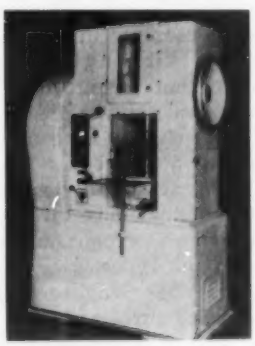
Development of an automatic pusher type furnace specially designed for bright brazing stainless steel at temperatures up to 2150 F has been announced.

The new furnace is adaptable for continuous brazing stainless steel with copper or stainless steel brazing compound. Its ability to maintain dry hydrogen atmosphere and to maintain uniform heat distribution, allows it to produce high quality products.

The furnace is a self-contained unit and is engineered for integration in production lines, thus reducing materials handling costs to a minimum.

Harper Electric Furnace Corp.
For more information, circle No. 199 on the Reader Service Card

POWDER METAL PRESS . . . incorporates new features



A line of presses, specifically designed for powder metal work, is now being distributed in the United States. These machines are said to combine many advanced features found in European presses together with a number of improvements that have been available up to now on specially built custom machines only.

The presses come in a variety of sizes up to a total capacity of 80 tons. Multiple upper and lower punch movements are available for the first time in a high speed fully automatic press.

According to the distributor of the machines, numerous safety devices have been incorporated also. As an aid to general maintenance and repair American standards have been used on threads, etc.

Two presses of the line are currently available and more will be added as rapidly as production facilities permit.

Haller, Inc.
For more information, circle No. 217 on the Reader Service Card

Good Barrel Finishing Costs Less with The Abbott Method

It's a fact! The Abbott Method of Barrel Finishing reduces costs because it features long-lived Abbott Burnishing Shapes. Made of selected carbon steel — deep hardened — tempered and polished to a mirror-like glass hard finish, Abbott Shapes make efficient contact on all sizes and designs of stampings and castings. Abbott Burnishing Shapes last longer, burnish more parts and cost less in the long run. Used in Abbott Vertical Barrels they make an unbeatable barrel finishing combination!

For Proven Performance . . . use The ABBOTT METHOD.

Improved Abbott Barrel!
Self-contained! Precision speed control! Color dynamic! Write for details . . . quick!

ABBOTT

THE ABBOTT BALL COMPANY
1084 NEW BRITAIN AVE.
HARTFORD 10, CONN., U. S. A.

For more information circle No. 80 on the Reader Service Card

FINGER BUFF
. . . especially for copper

Especially designed for buffing copper, a new cotton finger-type buff has been introduced.

Each buff section is made with a double row of overlapping and staggered fingers which gives desirable continuity to the working face of the buff.

This construction, developed specifically for the smooth buffing operation required for copper and like metals, is reported to eliminate all streaking and gouging.

The new buff is made for both hand and automatic operation.

Geo. R. Churchill Co., Inc.
For more information, circle No. 202 on the Reader Service Card

DIAMOND WHEELS
. . . feature new bond

A new method of bonding diamond into a diamond wheel, is said to guarantee the ultimate cutting life.

According to the manufacturer, diamond wheels made with PL-224, the new bond, cut freely without bond smear, maintain shape better, cut faster and last longer than any other wheel.

United States Diamond Wheel Co.
For more information, circle No. 211 on the Reader Service Card

FAST DIE CHANGE
. . . with interchangeable unit

In order to increase changeover rates and give greater pot capacity, one manufacturer of small die casting machines has announced an interchangeable unit consisting of the melting pot, plunger, sleeve, gooseneck and nozzle. This single unit having a capicity of 50 lbs. of zinc is heated by an atmospheric gas burner and can be removed from the machine or attached to it as a single unit.

For this same machine the entire die bearing unit can be removed and replaced with another one so that down time for die changing time is reduced to a minimum.

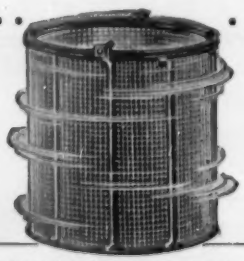
DCMT Sales Corp.
For more information, circle No. 203 on the Reader Service Card

DRIES SMALL PARTS *Faster–Better..*

DOES IT FOR LESS!

Kreider Dryer with auxiliary gas heating unit (illustrated). Auxiliary steam heating unit available; also standard model without auxiliary heating.

Basket (shown below). Heavy gauge steel woven mesh over steel frame. Capacity, 1140 cu. ins.



Spin-Dries* up to 50 pounds in less than 2 minutes

Simple design . . . careful engineering, sturdy construction assure trouble-free, low-cost maintenance operation. Operates at 625 r.p.m. on less than 1 h.p.

No scarring or marring . . . with Kreider Dryer. Centrifugal force holds parts immovable in basket . . . assures smooth, evenly dried surfaces, long-lasting luster, minimum "rejects".

One man runs it! Standard model Kreider Dryer occupies less than 6 sq. ft. floor space. One man tends—loads, unloads—keeps production moving, prevents expensive, time-wasting tie-ups.

See for yourself! Write Dept. PR 1154 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

***Only 2 simple steps required. . .**

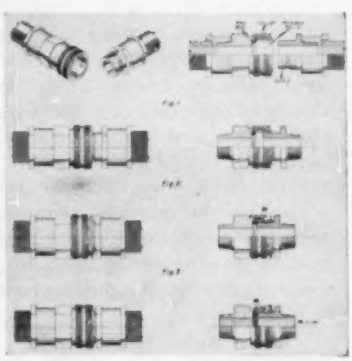
(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."

(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

NEW HOLLAND *KREIDER* DRYER

For more information circle No. 90 on the Reader Service Card

HOSE COUPLING
. . . for heavy duty lines



As an addition to a well known line of hose couplings, a new model for heavy duty work has been introduced.

The design of the coupling is such that the seal becomes tighter as the pressure increases. A swivel feature in the coupling prevents kinking to lengthen hose life and permit more rapid hose attachment.

The quick-seal coupling is made in a variety of sizes for different methods of hose attachment — female pipe thread, male pipe thread, expansion ring or barb shank types.

To provide long service life, all bearing surfaces in the coupling are heat-treated and ball bearings and springs are made of stainless steel.

Titeflex, Inc.
For more information, circle No. 208 on the Reader Service Card

PROTECTIVE FINISH
. . . for zinc die castings

A new material, known as Ker-Chro-Mite #1, is a chromate type solution (in concentrated form) for chemically polishing zinc and its alloys, cadmium and its alloys and brass. The process is said to be so simple it needs hardly any control, other than daily additions to replenish the bath.

The cost for producing a lustrous finish is about 0.1c to 0.2c per sq. ft. of surface treated and for protective finish the cost is about 0.03c to $.05c per sq. ft. of surface treated.

The process is operated at room temperature or slightly higher, and can be used for still tank plating, barrel plating or fully automatic machines.

Kosmos Electro-Finishing Research, Inc.
For more information, circle No. 206 on the Reader Service Card

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ALL-PURPOSE FILTER
. . . for acids and alkalines

After several years of successful field testing, a new self-priming and self-relieving filter unit is offered.

Constructed of type 316 stainless steel, these units are ideal for filtering all acid and alkaline solutions. Long-life neoprene impeller, large graphite bearings and ball bearing ring enclosed motors assure convenient, trouble-free operation under any conditions. The unit filters in depth, through cartridges of cotton, dynel and carbon, making possible microscopic clarifications, including removal of colloidal solids.

The filters are available with capacities from 60 to 1600 gallons per minute.

Metal Finishing Mfg. Corp.
For more information, circle No. 207 on the Reader Service Card

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BARREL NICKEL PLATING
. . . for bright deposits

An improved nickel plating process for barrel electroplating is reported to produce a fully bright ductile white deposit that has very low stresses.

The process, which has recently undergone extensive com-

Continued next page

For more information circle No. 75 on the Reader Service Card

STROH

Has Been Producing Excellent ZINC DIE CASTINGS Since 1903

We are a bit proud of the fact that numerous of our customers are in the third generation.

"Teddy" Roosevelt was president of the United States when STROH first produced zinc die castings. The fact that we still serve many of these early accounts, we believe, speaks volumes for the excellence of our product.

Inquiries Invited:

STROH DIE MOULDED CASTING CO.
525 East Michigan St., Milwaukee 2, Wisconsin

When You Think of *Aluminum Ingot*
THINK of S-G

The sign, S-G, on aluminum ingot means aluminum of uniform quality made to meet the most rigid chemical and physical specifications. Whether it's for permanent mold, sand or die cast you can be sure with S-G ingot.

Our complete modern research and testing laboratories are available to help you secure just the right ingot to meet your needs.

BRASS AND BRONZE INGOT ALSO PRODUCED TO YOUR SPECIFICATIONS

SONKEN-GALAMBA Corporation
MEMBER ALUMINUM RESEARCH INSTITUTE
Riverview at 2nd Street • Kansas City 18, Kansas

For more information circle No. 73 on the Reader Service Card

mercial testing, is also characterized by stability of plating solution over long periods, and deposits that require no activation prior to chromium plating.

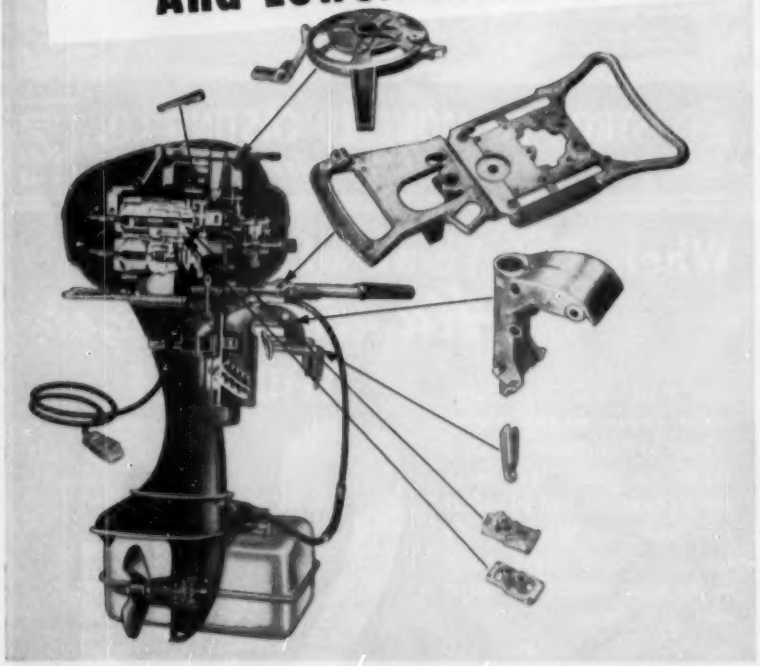
Continuous filtration is not required with this process, but periodic filtration through filter-aid material is suggested. Bath purification is usually unnecessary but if organic or inorganic types of contamination reach abnormally high levels, such treatment may be used effectively without any harmful effect to the bath.

Hanson-Van Winkle-Munning Co.
For more information, circle No. 213 on the Reader Service Card

REFERENCE DATA
continued from page 19

88. INDUSTRIAL FINISHING MACHINE for removing burrs and edge finishing metal, plastic and wood parts is described in a booklet from the Mead Specialties Co.
89. MANUAL ON BARREL FINISHING covering all phases of this process is available from Minnesota Mining & Mfg. Co.
90. DRYING SMALL PARTS in a two-step completely automatic cycle is the subject of a folder from New Holland Machine Co.
92. METAL CLEANING MANUAL a hand book on the removal of all types of soil from all metals has been published by Oakite Products, Inc.
93. INCREASED DIE LIFE is made possible by Hydro Finishing. Bulletin 1400 A from the Pangborn Corp. describes this method of finishing dies and other parts.
94. SURFACE FINISHING of parts too large or too special for standard barrels can now be done by the Roto Finish process. A new circular describes the equipment and its uses.
96. METAL POWDER PARTS that meet both metallurgical and physical specifications is the subject of booklet MP-532 published by Thompson Products, Inc.
5. A REPRINT of a recently published article on the history and facilities of the aluminum smelting industry is available from the Aluminum Smelters Research Institute.
48. DIE CASTING MACHINE specifications with notes on the special features of the HP-1-C machine are contained in a catalog from Lester-Phoenix, Inc.
65. COST CUTTING through the use of die cast components is discussed in literature that is available from Precision Castings, Inc.
43. COST CUTTING with investment castings is the subject of a booklet entitled "A Machinest's Nightmare Becomes a Designer's Dream," published by The International Nickel Co., Inc.
47. THE ADVANCED DESIGN of Lake Erie Engineering Corp.'s die casting machines is fully described, illustrated, and all specifications given in a comprehensive catalog.
66. THE DIE CASTING PROGRESS, its advantages, limitations and some design information are covered in a brochure that has been prepared by Pressure Castings, Inc.

More Efficient Production, Better Product Performance And Lower Costs . . .



are reasons why SCOTT-ATWATER uses ACCURATE die castings

■ Because of their uniformity and light weight, ACCURATE die castings greatly reduced the time required for handling and assembly. Cast to close tolerances, they reduced or eliminated machining operations, special tooling and scrap loss. In addition, a more dependable and efficient motor was produced with die castings that have high strength-light weight properties and are non-porous and leakproof. Perhaps you too, can improve your product and profit picture with ACCURATE die castings. Write, wire or phone if you have a parts problem demanding immediate attention.

ALUMINUM • ZINC • MAGNESIUM DIE CASTINGS

ACCURATE DIE CASTING CO.
3089 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 2 on the Reader Service Card

Industry News

Companies · Plants · Associations

ALUMINUM SMELTERS RESEARCH INSTITUTE ELECTS OFFICERS

Aluminum Smelters Research Institute at their Annual Meeting at the Greenbrier, White Sulphur Springs, West Virginia, elected E. A. Bergman, U. S. Reduction Company, East Chicago, Indiana, president; A. Nichamin, Federated Metals Division, American Smelting and Refining Company, Detroit, vice-president; J. M. Stone, Aluminum Smelting and Refining Company, Inc., Bedford, Ohio, treasurer. Carl H. Burton remains as secretary. Offices of the Institute are at 20 North Wacker Drive, Chicago 6, Illinois.

COOPER ALLOY CORP. IS NEW FIRM NAME

The Cooper Alloy Foundry Co., Hillside, New Jersey has announced that the name of the company has been changed to Cooper Alloy Corp. With the change in name the corporation announced the individual identification of four major divisions.

They are: Foundry Products Div., stainless steel sand, shell mold and centrifugal castings; Valve & Fitting Div., stainless steel valves, fittings, and accessories; Aircraft Products Div., stainless steel rings for military aircraft; Stainless Engineering & Machine Works Div., production machining of stainless steel components.

According to Harry A. Cooper, company president, Cooper Alloy is one of the nation's oldest and largest producers of stainless steel cast products, but for many years it has been manufacturing special product lines in addition to producing custom stainless castings.

INTERNATIONAL DIE CASTERS MEETING HELD IN LONDON

The first International Pressure Die Casting Conference was held in London, England from October 25 to 28, 1954. The conference was arranged by the Zinc Alloy Die Casters Association and the Zinc Development Association with the support of the European Pressure Die Casting Committee.

The conference had as a principal object, the opportunity for die casters to meet and exchange ideas with die casters from other countries; and to draw attention to the merits and versatility of the die casting process.

Coincident with the conference was the London Motor Show so that conference delegates had an opportunity of examining the die castings used on the new European cars.

New Film Depicting Die Casting Process Made Available To Industry

A new 16 mm color and sound motion picture which shows how to improve product design and at the same time reduce costs through extensive use of the die casting process is now available to industry and educational organizations from the American Zinc Institute, Inc., 60 East 42nd Street, New York 17, New York.

Entitled "Die Casting — How else would you make it?", the film, which runs 35 minutes, describes the advantageous application of this important production method. Prints of the film are available now for use by industrial organizations, technical societies, engineering colleges, universities and government agencies. Bookings for the film are being made now by the American Zinc Institute.

When bookings for the film are accepted by the American Zinc Institute, arrangements can be made on request through the cooperation of the American Die Casting Institute, a national association of jobbing die casters, to provide technical commentators and exhibits for each of the film showings.

DIE CASTING an automobile defroster duct is one sequence in the new AZI film on the die casting process.

A 28-page booklet entitled "Die Casting — Molten metal to finished part . . . direct", which contains supplementary technical information, has also been prepared by the American Zinc Institute and will be made available for distribution among the

Every day is Saturday...

at Belmont!

If our ingots were infantrymen, they'd blow their tops! For every day—and all day—is inspection day at Belmont.

Not a single drop, square, stick, grain or ingot "gets by" the critical eye of Belmont metal experts in anything short of perfect condition...at any stage of production.

And Belmont quality is exceeded *only* by Belmont service—the result of 59 years of "falling in" on time.

Better buy Belmont...for both!

Belmont

SMELTING & REFINING WORKS, INC.

307 BELMONT AVENUE • BROOKLYN 7, NEW YORK

"Putting Mettle into Metals Since 1896"

Circle No. 16 on the Reader Service Card

Die Casting Film — Cont.

audience following the film presentation.

A comprehensive evaluation of zinc, aluminum, magnesium and copper base die casting alloys is presented in the film outlining advantages and adaptability features of each. Detailed examination of 45 outstanding examples of parts die cast of the various alloys points out the design flexibility of die casting in producing complex shapes within close dimensional limits.

Versatility and scope of the die casting process is vividly depicted by showing the wide range of shapes and sizes readily achieved. A typical case history presentation, Figure 1, follows a zinc die cast automotive radiator grille through casting, automatic buffing, polishing and plating operations. Successive steps of buffing and polishing, emulsion cleaning and spray rinsing, acid etching, copper flashing and build-up, nickel coating and final bright chromium plating illustrate how the excellent surface finish achieved in die casting facilitates the application of decorative and protective coatings.

Latest design developments in die castings as well as the most up-to-date production methods have been recorded in the film. One sequence shows how an automobile defroster duct composed of several individual zinc die castings is formed, assembled and shipped as a completed unit by the die caster.

ARWOOD MFG. NAMES PLANT MANAGER

The appointment of Rudolf O. Prosser as plant manager of Arwood Manufacturing Corp., Groton, Conn., has been announced by Hal Tarry, personnel manager. He succeeds Patrick J. Dwyer, who resigned several months ago.

Mr. Prosser was formerly assistant quality control manager with Carl L. Norden Manu-

AUTO-DIESEL Plunger Rings Last for **MONTHS** So— WHY NOT USE THEM?

Auto-Diesel hardened steel Plunger Rings will give you far better service, much longer life than you can possibly imagine. They are a new development of Auto-Diesel Engineers and will reduce down time and cost of replacements. These rings were especially designed for those operating die casting machines or casting zinc parts. They are made of hardened steel, dieloy cast iron or cast iron. Remember, they last for MONTHS not HOURS, so why not use them?

AUTO-DIESEL TWO PIECE PLUNGER RINGS *are especially made for* . . . **HOT CHAMBER DIE CASTING MACHINES**

The Auto-Diesel Two Piece Plunger Segment Rings were especially developed for a special job and, therefore, give better than average performance. Users of hot chamber die casting machines will recognize the difference in performance. They are made of high grade wear resisting iron. Casting sizes available — 1-½", 2", 2-¼", 2-½", 2-⅝", 2-¾", 2-⅞", 3", 3-⅛", 3-⅜", 3-⅞", 4" by ⅞". Write today for prices. We can make prompt delivery.

Write for Details

THE AUTO-DIESEL PISTON RING CO. "RINGS and SHAPES Since 1921"

3135 Superior Avenue • Cleveland 14, Ohio

For more information circle No. 11 on the Reader Service Card

facturing, Inc. of New York and the Bendix Aviation Corporation, Peterboro, N. J. He has been identified with the Arwood corporation for the past 10 years.

Mr. Prosser is also a vice president of the Arwood Manufacturing Corporation plants in Groton and in Tilton, N. H., both subsidiaries of the Arwood Precision Casting Corporation of Brooklyn, N. Y.

AJAX ELECTROTHERMIC EXPANDS 50 PERCENT

Addition of a new air-conditioned building to the Trenton, N. J. plant of Ajax Electrothermic Corp., represents almost a 50 percent physical expansion of the company's engineering and administrative departments.

Growth of the induction heating and melting field has accelerated steadily since 1916, when Ajax introduced the first high frequency induction furnace for commercial use. Since then the number of new induction furnace installations has increased sharply each year. While accurate figures are not available,

More high frequency electric furnaces will be built here.

it is estimated that in excess of half a million kilowatts of induction heating and melting equipment is in use.

MORE FURNACES POUR ALUMINUM AT KITIMAT

The second series of electric furnaces at the new Kitimat aluminum center commenced producing aluminum September 29, according to an announce-

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A progressive producer of fine quality die castings. A reputation built by exceptional abilities and the use of the most modern equipment and methods. If you are looking for good die castings and exceptionally good service at a minimum cost, you'll get them from Chicago White Metal Products, Inc.

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BLAST CLEANS CHEAPER
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50th Anniversary Medallion

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ment by officials of Aluminum Company of Canada Limited. With two pot lines producing aluminum, the first phase of the Kitimat smelter is now in full production.

The first pour of metal from the first line of furnaces took place at Kitimat on August 3, 1954. That climax to 3½ years of construction work is now followed by the starting of this second line and brings production to the rated capacity of 91,500 tons per annum.

WHERE CREDIT IS DUE

Credit for producing two die castings illustrated in the September issue of PMM was accidentally omitted. Two jobbing die casters whose castings were not identified are: Litemetal Dicast Co. (chain saw gas tank cover on page 4) and Tool-Die Engineering Co. (cover for a mechanism on a Wurlitzer recording machine). Our apologies.

MERCAST TO BUILD WEST COAST PLANT

Plans for the construction of a new plant in LaVerne, California, have been announced by Admiral Alan G. Kirk, chairman of the board of the Mercast Corp., New York.

The new California plant will be located on a 4½ acre site, which Mercast has purchased, on the Santa Fe Railroad main line, 30 miles east of Los Angeles and just west of Pomona. The facilities, which are expected to be in full operation early in 1955, will total 12,500 square feet.

NEW CHICAGO WHITE METAL REP

Chicago White Metal Products, 5239 W. Grand Ave., Chicago, Ill., has announced the appointment of Sydney Gregory as sales representative for the company in Northern Indiana. Mr. Gregory lives at Michigan City, Ind.

REPRESENTS LESTER-PHOENIX IN MICHIGAN AREA

The Michigan area will soon become acquainted with M. R. Tenenbaum who will represent Lester-Phoenix, Inc., effective November 15, 1954, in the sales

M.R. Tenenbaum

and service of their die casting and injection molding machines.

"Mike", a native Clevelander, graduated from Case Institute of Technology with a major in chemical engineering and went on to do graduate work there in metallurgy. He has worked successively at National Acme, Ward Products, for the City of Cleveland, and his last 11 years were spent as chief metallurgist of Monarch Aluminum Mfg. Co.

He is a licensed professional engineer, active in ASTM, a past president of the Cleveland Society of Spectroscopy, and has served on committees of the American Die Casting Institute.

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Powder Metallurgy Fabrication

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HITCHINER MFG. EXPANDS INVESTMENT CASTING PLANT TO INCREASE CAPACITY 50%

The Hitchiner Manufacturing Co. of Milford, N.H., announces the completion of a plant expansion program which is expected to increase the production capacity of the company by 50 per cent.

By enlarging their die making department, this investment casting firm will remove a production bottleneck, thus permitting full utilization of the casting department.

The Hitchiner plant area has been increased twice in the last 3½ years, while the number of employees has been almost doubled to facilitate the handling of volume orders.

While most of the new floor space will be used by the extensive die making department, the balance of the addition will be used for both a company cafeteria and for a vault in which dies will be stored.

For more information circle No. 1 on the Reader Service Card

NEW!

HIGH SPEED A.B.C. DIE CASTING MACHINE

Free Cycles Over 1000 Shots Per Hour

Here's the new A·B·C high speed, low cost die casting machine which eliminates costly production of small die castings on large die casting machines. Air operated, the machine produces small non-porous lead, tin and zinc alloy precision die castings up to 1½ lbs. The A·B·C is economical to operate and easy to set up. Its lightning production speeds makes single cavity molds practical and profitable.

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- AUTOMATIC TIMING
- CALIBRATED TEMPERATURE GAS CONTROL
- GAS BURNERS
- DIE BLOCKS
- AIR REGULATOR
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Write today for engineering data and prices. Ask for bulletin A-10.

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3 STARS by JOHNSON

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ALLOY High strength, hard to machine alloys are cast, eliminating production and performance problems.

MACHINING Tricky shapes, involving complicated machining, are investment cast to shape.

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ODD SHAPES—EASY SHAPES.
continued from page 53

stringent performance requirements of the Air Force, for which the instrument is produced. All external contours are carefully checked with special gages. In addition, the completely assembled instruments are 100 percent subjected to a cold test to detect dimensional changes, excessive cumulative tolerances, etc. In this test, the instruments are put through an eight hour freezing cycle, during which they soak at -54° C for four hours.

The investment caster has been able to core many of the holes required in the housing, even holding some center distances as close as .004. A number of holes, however, are drilled in the casting, either because of the small diameter, critical center location or position in the casting.

Fit of the three castings is very critical, and this job of matching contours is given careful attention. Sets of housing components are mated after grinding and machining, and then are anodized. The black anodic coating meets Air Force regulations.

Among the factors which Syncro Corporation has found especially useful in investment cast housings are: a) the ease with which minor design changes can be made, and b) the speed of delivery from print to production castings.

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Where You Want Perfect Die Castings with a Hardware Finish, Use

IMS PURE SILICONE MOLD LUBRICANT

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- No Carbonaceous Deposits
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Unbroken Doz.	$18.00
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POSITIVE REGISTER

continued from page 55

the positioning bar so that there can be no side-play once the unit is locked in position.

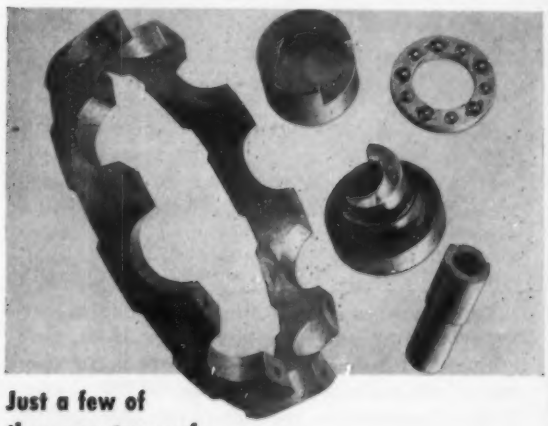
Square bosses jutting from each side of the lower die casting, Figure 2a, increase the surface area which bears on the square bar, assuring maximum rigidity although not unduly increasing the over-all thickness of the casting.

These square bearing bosses have been staggered in such a way that the boss extending from one edge of the casting mates with a square cored hole on the other side. This permits the blade holders to be placed in close juxtaposition without sacrificing the wide bearing surface.

Top and bottom casting must register together very accurately. The freedom of shape and inherent accuracy permitted by die casting, makes possible the incorporation of mating lugs and recesses, Figure 2b, that guarantee accurate alignment of the razor blade when the two die castings are clamped together.

To facilitate accurate installation of the razor blade, a cored recess for the blade has been provided, together with two low bosses that fit the

Continued next page



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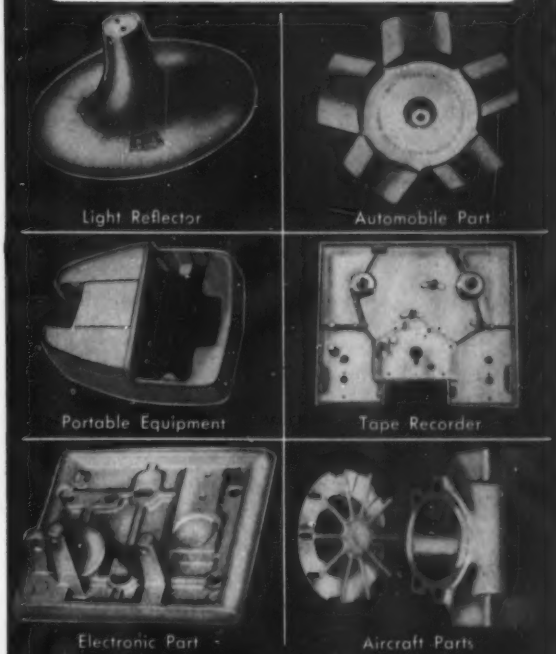
In the Electrical Manufacturing Industry

There Are Unlimited Applications for Die Casting Parts and Components from Aluminum and Magnesium



Light Reflector · Automobile Part · Portable Equipment · Tape Recorder · Electronic Part · Aircraft Parts

As shown in the illustrations above, parts for electrically operated equipment can be die cast from Aluminum and Magnesium in practically every shape and form. These new alloys not only greatly reduce weight but their toughness and mechanical strength are adequate for all demands placed upon them. Die Castings, such as these, offer greater scope to the designer, and to the manufacturer — important savings through the virtual elimination of machining, finishing and assembling.

Manufacturers throughout the country of products listed in the following fields, are successfully using Die Castings of Aluminum and Magnesium produced by LITEMETAL: Business Machines • Home Recorders • Electric Motors • Electronic Equipment • Portable Tools • Home Workshop Equipment • Home Appliances • Automotive Electrical Equipment • Projectors • Radio Television and Telephone Equipment • Aircraft Equipment • Farm Equipment • Marine Equipment.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

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DIE CASTINGS
CUT MANUFACTURING COSTS

Yes, we produce castings of many shapes and sizes, some very intricate and others simple in design. But, regardless of size and shape, you can depend on PARAMOUNT to give you strong, clean castings, uniformly accurate to close tolerances to reduce your machining, finishing and assembly time.

We offer a complete service of design and engineering, die making, production and machining.

We invite you to consult with us on your die casting needs. Your inquiries are welcome.

Descriptive literature will be mailed on request.

ALUMINUM AND ZINC DIE CASTINGS

PARAMOUNT
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For more information circle No. 63 on the Reader Service Card

3. LESS EXPENSIVE and smoother surfaced than cast iron, these pulleys and finger holder are now die cast in zinc.

holes in the two edged blade. It is thus a simple matter to slip a blade into position and lock it with a quarter turn of a specially designed snap fastener. Then the two die castings are likewise fastened together with a similar fastener in a fraction of a second.

Despite the provision of many special features, very little machining needs to be done on the castings. Cross holes for the hinge pin, and an angular hole for set screw are drilled and the latter is tapped. Flat surfaces that clamp to the bar are also machined.

Three other zinc die castings are used in other special process machines built by Charles Beck Machine Corp. A group of these castings is shown at Figure 3, including two belt pulleys and a finger holder and guide.

The shape of these castings is relatively simple, and yet die cast pieces are less expensive than comparable gray iron castings because of the need for smooth, accurate surfaces.

TITANIUM METALS CORP. AT FULL-CAPACITY PRODUCTION OF TEN TONS PER DAY

Full capacity production of 10 tons per day of high quality titanium sponge has been achieved for the past month by the Titanium Metals Corp. of America at its Henderson, Nevada plant. It is expected that constant 10-tons-per-day operation will continue indefinitely, with the likelihood of even further quality improvements.

The company signed the first facilities contract for titanium sponge with the U. S. Government in July 1951. Leases were secured on major components of the $150,000,000 former Basic Magnesium, Inc. plant in Henderson, Nevada, built by the Government during World War II and 151,000,000 kilowatt hours of power allocated from nearby Hoover Dam by the Colorado River Commission. First actual production of titanium sponge came in October 1951. Titanium Metals Corporation of America is owned jointly by National Lead Co. and Allegheny Ludlum Steel Corp.

Production of titanium metal in the United States for the last year totaled 2350 tons; the new annual production rate at Henderson exceeds the combined 1952 and 1953 total output of titanium metal by all companies in the United States. In 1948 only three tons of titanium metal were produced.

USES FOR PLASTER MOLD CASTINGS

continued from page 45

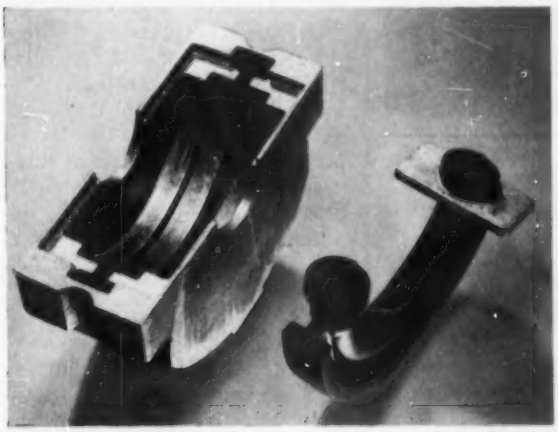
face for good sealing with the control body casting. On the other hand, the sand casting has a uniformly thick wall because of the problems of shifting cores that is characteristic of the process.

Surface finish of metal that is cast against a gypsum plaster mold is far superior to that produced by a sand mold. Since the exterior of these castings are painted, and appearance must be considered, the sand castings had to be sanded all over. This is not needed by the plaster mold casting.

Castings for development

How plaster mold castings can be used for product development and preliminary testing is illustrated in Figure 5. This portable remote control unit is now undergoing a test program.

The peculiarities of shape needed in this casting make plaster mold techniques the only low cost method of fabricating, especially in the limited quantities needed for a pilot run. As



5. THIS "T" SLOT has been cast to shape, with smooth internal surfaces that need no machining or polishing. The molded rubber piece at the right slides into the slot.

can be seen in the photo, a molded rubber tube with an integral anchoring strip, is mounted in the cast aluminum housing. The anchoring strip must slip into the T-slot in the casting.

Obviously, the inner surfaces of the cast slot must be smooth to permit insertion of the rubber piece. The shape of the slot would be difficult to machine or polish, and therefore must be cast smoothly. By using plaster mold castings, with the smooth-surfaced plaster core, this slot can be cast to size and surface specification.

It is possible, also, to provide most other surfaces within close enough dimensions that little machine work is needed. Since machine work on a pilot run would be largely skilled, hand setup work, the saving from plaster mold casting is apparent.

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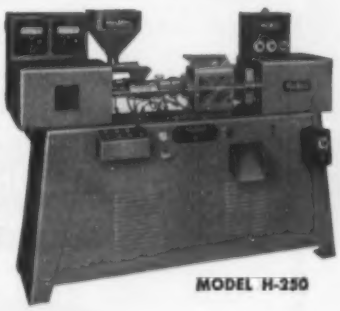
Typical precision parts produced by investment casting, using styrene patterns molded to .003" tolerances on Van Dorn Presses.

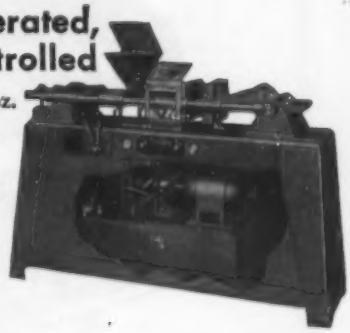
2½ oz. Automatic and 2 oz. Semi-Automatic Presses

These injection presses feature safe, simple push-button controls. Accurate temperature regulation. Rugged, compact, quiet.



MODEL H-250

Power-Operated, Lever-Controlled Presses — 2-oz. or 1-oz. models. Have many automatic and safety features.



MODEL H-200

Plastic Grinder — grinds up waste, rejects, etc., for re-use.

Mold Bases for these presses available from stock.

Write for information on this equipment.

MODEL G-100

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STRENGTH . . .

. . . is the prime requisite for this meat-chopper cutting ring. Compacted from HVA electrolytic iron powder, its properties are: tensile strength — 57,000 psi; yield strength — 46,000 psi; elongation — 15%.

DUCTILITY

. . . is clearly demonstrated by a full 360° cold twist applied to this sewing machine connecting bar. It's a compact of HVA electrolytic iron powder with these properties: tensile strength — 40,000 psi; yield strength — 29,000 psi; elongation — 32%.

You'll get these—and more—with HVA electrolytic iron powder

These are only two examples of the broad range of applications for HVA electrolytic iron powder parts available to designers and buyers. It will pay you to investigate all the ways they can improve your present products, inspire future ones.

For facts on how HVA electrolytic iron powder can improve your product write to

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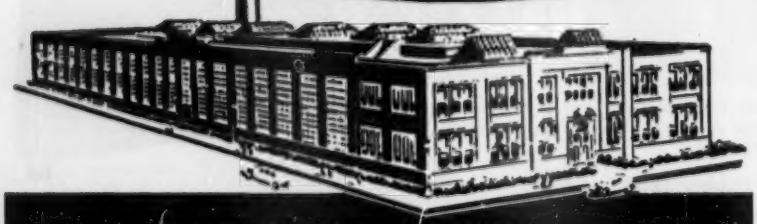

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BERYLLIUM COPPER
continued from page 43

embrittlement in subzero atmospheres. In addition, beryllium copper retains the inherent nonmagnetic and nonsparking qualities of copper.

Where final properties may be of secondary importance, beryllium copper is frequently selected for its excellent casting qualities. By virtue of relatively low pouring temperature and good fluidity in the molten state, it is especially adapted to pressure and investment casting.

Tables I and II afford a comparison among the three beryllium copper alloys most frequently employed for investment and pressure castings. Alloy 200-C is currently considered the standard for investment casting, while alloys 240-C and 250-C are widely used for pressure castings.

For investment castings, alloy 200-C offers an excellent combination of strength and castability. Since it has the lowest beryllium content of these three casting materials (see Table I), it is the least expensive. In addition, it meets the requirements of Military Specification MIL-C-17324.

Alloy 240-C offers the highest strength of any copper-base casting material. Its relatively high nickel content is particularly effective in refining the grain and suppressing the hard, but brittle, beta phase. High nickel also retards overaging, so that this alloy can be depended upon to provide good service at moderately-elevated temperatures. Consequently, this alloy may supply special advantages for investment castings requiring maximum strength and impact resistance.

Alloy 250-C has long been a favorite for the pressure casting of molds for plastics and other uses requiring optimum strength and wear resistance. Some care should be exercised in employing this alloy for applications requiring shock resistance, since the unusually high hardnesses

are obtained only through some sacrifice in impact qualities.

These disadvantages have been overcome with the introduction of lower-cost Alloy 240-C. Although Alloy 250-C provides superior hardnesses by virtue of its higher beryllium content, this is not the case for tensile and yield strengths or elongation (see Table II).

Consequently, indiscriminate use of hardness tests may prove misleading, particularly when employed as a means for comparing different materials. Similarly, conversions from hardness to tensile strength are especially dangerous.

Each of these alloys plays an important role in the production of beryllium copper pressure and investment castings, however, some care should be exercised to prevent misapplication.

FEDERATED METALS ORGANIZES CASTING CLINIC

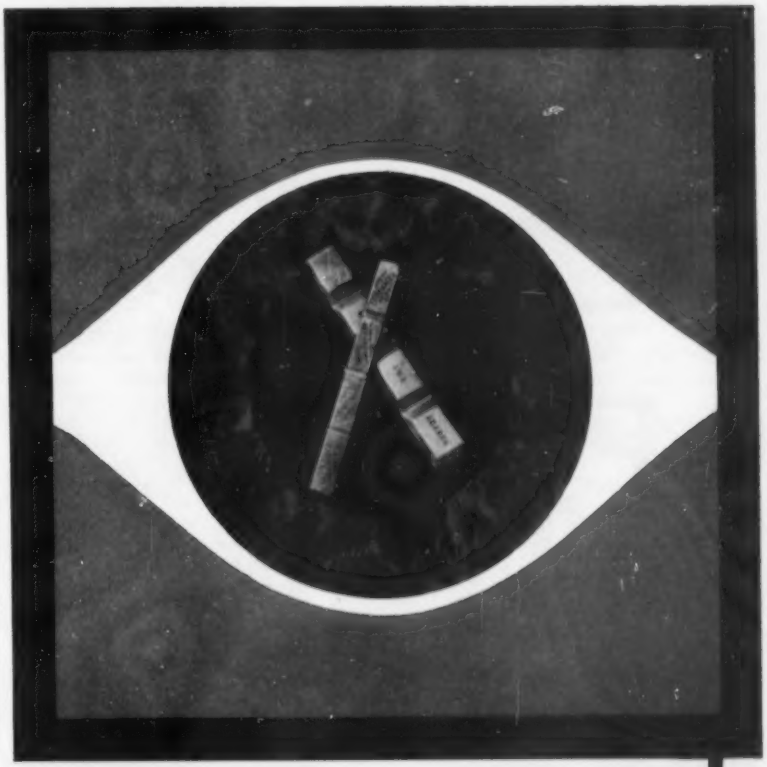
Federated Metals Division, American Smelting and Refining Co, has inaugurated a series of casting clinics as a service to non-ferrous foundrymen in the metropolitan New York and Philadelphia areas. The first of the series, a one-day affair planned for foundrymen located within easy commuting distance of South Plainfield, N. J., was held October 13, at Asarco's Research building in that city.

R. A. Colton and D. L. LaVelle, authorities on both brass and aluminum foundry procedures, conducted informal discussions on a variety of subjects, including choice of alloys, melting, gating, risering, pouring, analysis of defects, and gases in metals.

HIGH STRENGTH STEEL
continued from page 51

ratios of over 97 percent at pressures of 60 to 80 tsi.

However, where it is desirable to have more carbon in the core of pieces, particularly with larger pieces, extra carbon is used in the original powder mixture so that after removal of a



Let's look at the facts about die casting metals

Most people claim aluminum and zinc die cast alloys are pretty much the same wherever you buy them. Maybe. But that's not the point.

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For more information circle No. 30 on the Reader Service Card

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With Stainless Steel Melting BILL-ETTES, you can save time and money in precision investment casting . . . not just once, but every time you need a melt! Why? Because there's no cutting from larger units . . . no question about heat number or kind of alloy! BILL-ETTES come in 30 different alloys in exact specifications . . . are packed 100 pounds to the keg . . . and each unit is identical in composition to every other unit! Size to meet your needs. Avoid costly waste . . . be sure of your analysis . . . use Certified Alloy Melting BILL-ETTES.

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small amount of carbon during sintering, the desired amount of carbon will remain in the core. Since more carbon in the iron increases its hardness, such pieces cannot then be re-pressed to as high a final density ratio and hence do not have as good mechanical properties as Class A steel.

Carbon up to about 0.6 percent can be left in the core of the compacts after the sintering. Steel made in this way is called Class B steel and has the mechanical properties shown in Figure 2. It is particularly useful in making larger parts for which through-carburizing would take too long a time.

The carbon remaining in the core of the briquets can be adjusted to have any desired value from about 0.1 percent up to about 0.6 percent by regulating the amount of carbon used in the powder mixture. Carbon can also be introduced by gas carburizing after the re-pressing operation, all the way through in the case of small pieces, or as a case of pre-determined carbon content for both small and larger pieces.

Thus the process is very versatile and can be adapted easily to particular parts as illustrated by the examples described above. In most cases parts need not be carburized long enough to produce a uniform carbon content throughout, since most parts require the hardness, wear resistance, and strength imparted by high carbon content only near their outside surfaces. In fact, one of the most useful modifications of the process is that in which enough carbon is used in the original powder mix to produce a tough low-carbon core, and after the second pressing, a relatively thin high-carbon case obtained by any conventional carburizing method is hardened to produce a hard, strong, wear-resistant surface.

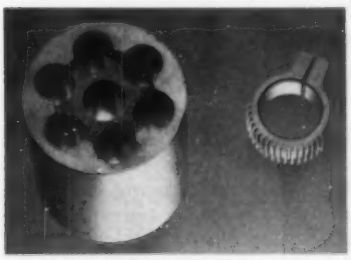
Another of the requirements for getting the necessary high density ratio is that the pressures used in the two pressing operations should be within cer-

tain critical ranges. The pressure used in the first pressing operation should never be over 40 tsi, since pressures higher than this tend to weaken rather than strengthen the final piece by causing cracks which cannot be healed in the subsequent sintering, re-pressing and heat-treating.

The pressure used in the final pressing must be at least 60 tsi in order to produce the required critical density ratio.

In the second pressing operation, friction between the compact and the die walls must be minimized if a high density ratio is to be obtained.

Before the second pressing, the briquets contain a high percentage of interconnected porosity. If a penetrating lubricant were applied, its presence in the pores would prevent their being closed during the re-pressing and the high density ratio could not be obtained. Isthmian has developed and patented a method of applying a film of solid lubricant to the surface of the briquets in such a way that it does not penetrate the pores to an objectionable degree.



10. REVOLVER CYLINDER and gear segment shown here are two parts which can be produced by the process described.

In this method a lubricant such as white soap is dissolved in water and used to coat a quantity of pellets of the type which are used in barrel burnishing. After coating with a solution, the pellets are dried, leaving them coated with a thin film of dry soap. The briquets to be lubricated are then tumbled with the coated pellets and received a thin uniform coating of the lubricant.

The pellets are chosen of such a shape and size that all the surfaces, including internal angles and holes of the briquet, receive a thorough coating.

After re-pressing, additional carbon is introduced into the pieces by gas-carburizing. In the case of Class A steel substantially the entire final carbon content of the piece is introduced at this stage, while in the case of Class B steel the core may already contain all its carbon and additional carbon may be introduced only as a high carbon case.

Particularly when the carbon is to be diffused all the way through the parts the total carburizing time can be minimized by first carburizing the parts in an atmosphere of high carburizing potential for approximately 1/3 of the total time, then reducing the carburizing potential to be in equilibrium with the desired final carbon content of the parts for the balance of the time.

Other issued patents cover special features of the processes

Continued next page

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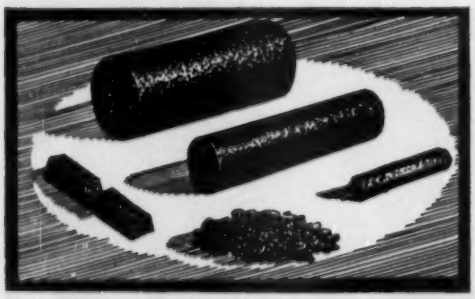

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relating to the prevention of burr formation and die wear during the second pressing operation.

All the operations in preparing the powder, compacting, sintering, and carburizing are done with standard equipment which is commercially available.

The briquetting operation is done most conveniently on conventional mechanical powder presses, whereas the re-pressing operation is best done on hydraulic presses which can be adjusted to press to a pre-determined pressure rather than to a pre-determined length of stroke.

The carburizing is most conveniently done in a gas carburizing furnace equipped with a carburizing potential sensing element and automatic control of the carburizing potential of the furnace atmosphere.

No special problems are involved in the die making. Carbide die cavity inserts are used in the second pressing dies, and show no wear or abrasion over long runs. While steel dies may sometimes be used for briquetting, carbide inserts are preferred, particularly if long runs are to be made.

For most parts, separate die-and-punch sets are required for the first and second pressing operations.

Because of the high density ratio achieved in the second pressing, it might be thought that the two dies would have to be matched extraordinarily closely to each other in dimensions in order to avoid getting below-critical density ratios in regions of the compact close to abnormally high clearance spaces between the compact and the second-pressing die cavity. However, this is avoided by a unique system which enables both dies of a set be made to the ordinary die-making tolerances, and still produce finished parts with the uniform high-density ratio over the entire part.

---

[1] Patents issued covering principal features of the Isthmian processes include No. 2,489,838; No. 2,411,073; No. 2,554,723; No. 2,489,839; No. 2,495,823 and No. 2,540,457.

Simplified Solutions for product design problems

THERE ARE MANY WAYS to make spools, depending upon the material to be wound on them, the re-use requirements, quantity needed, weight and inertia factors (as in the textile industry), and amount of wear expected. Die castings are finding increased usage for spools, especially where light weight, smooth surfaces, long life and low cost are important. Shown here are spools for winding rubber thread. They are die cast in magnesium by Dow Chemical Co., taking advantage not only of the lightweight of the metal, but also utilizing the good compressive strength of magnesium to withstand the pressure of the wrapped rubber threads.

MOLDINGS BY DIE CASTING offer many advantages not readily obtained by extruding, rolling or other forming methods. The auto industry has long employed die cast zinc moldings for auto trim, and the appliance industry likewise is using die cast zinc molding, handsomely chromium plated. As an example of the reasons for this trend, examine this die cast molding strip cast by Grand Rapids Brass Co. for use on a refrigerator. It does a better job than extrusion or roll forming because: 1) the contour and section can be varied along its entire length as called for by the product designer; 2) studs for mounting with spring type fasteners are formed integrally and require neither producing nor attaching studs as a separate operation; 3) except for plating, no secondary machining or other operations are needed by the castings.

OFFER TO BUY REED-PRENTICE CORP.

The Package Machinery Co. of East Longmeadow, Mass., has offered to purchase the Reed-Prentice Corp. of Worcester, Mass.

The information concerning the purchase of the Company was issued in a joint statement by Roe S. Clark, president of Package Machinery, and Frederick W. McIntyre, Jr., president of Reed-Prentice.

Magnesium In Use Is Theme Of Meeting Of Magnesium Association

Talks by Dr. Arthur Compton, Nobel prize-winning physicist and A. J. Bell, of Johns Hopkins University's Applied Physics Laboratory will highlight luncheon sessions of the Tenth Annual Meeting of the Magnesium Association. The meeting is scheduled for Monday, Tuesday and Wednesday, November 15, 16 and 17 at the Hotel Chase, St. Louis, Mo.

For the first time in many years the meeting is being planned for three days so that those in attendance will be enabled to visit the recently-opened magnesium rolling mill of the Dow Chemical Company at Madison, Ill., just across the river from St. Louis.

Taking as its theme "Magnesium in Use", a balanced program covering casting, fabricating, finishing and application problems has been organized. Discussion of the various phases has been grouped so as to assure each session presenting material of interest to all. At the close of the second day's general meeting, the Annual Meeting of The Magnesium Association will be held.

As has been the custom in the past, daily sessions of the meeting will be open to all without charge. The program is planned to serve as a means of broadening both general and specific knowledge of magnesium for those working with the metal and for those contemplating its future use.

Details regarding the annual meeting or the Association in general are available from Jerry Singleton, executive secretary, The Magnesium Association, 122 East 42nd Street, New York 17.

SUPERVISES ALLOY OPERATION

Hugh (Pat) Gibbons' appointment as supervisor of the Rx Met Division has been announced by the Michigan Steel Casting Co. of Detroit, Mich., manufacturers of slug, ingot and shot, certified alloys for precision investment casting.

Mr. Gibbons, whose appointment is effective immediately, came to Michigan Steel Casting from the Cannon Muskegon Corp. where he held the position of plant superintendent.

For more information circle No. 14 on the Reader Service Card

PETERSON HEADS SALES FOR ELIZABETH CARBIDE

"Mel" Peterson, formerly sales-manager of National Carbide Die Co., McKeesport, Pa., is now associated with Elizabeth Carbide Die Co., Inc., also of McKeesport, Pa., in the same capacity.

Ewell Lough

Mel Peterson

Ewell Lough is president of Elizabeth Carbide Die Co., Inc. Mr. Peterson started in 1940 with Firth Sterling (Carbide Division), where he remained seven years, moving then to National Carbide.

Mr. Lough began at Firth Sterling in 1939. In 1952, he founded the Elizabeth Carbide Die Co.

FOUNDRYMEN HOLD INTERNATIONAL MEETING

The 21st international foundrymen's convention was held in Florence, Italy on September 18-25. Eleven nations were represented in either the technical sessions or exhibits, and 55 papers were presented.

Among the papers of special interest to users and manufacturers of precision molded parts were: "The Importance of Shell Molding According to Croning in the Modern Foundry", "New Possibilities Offered by Precision Casting (investment casting)", "Some Methods for Casting Anisotropic Permanent Magnets on an Iron-Cobalt-Nickel-Aluminum Base", and "Ultrasonic Testing and Inspecting Devices".

Among the exhibitors at the international convention were the Italian Foundryman's Supply Association, the Italian Gray Iron Foundryman's Association, the Italian Steel Workers Association, the Italian Non-Ferrous Founders Association, Microfusione Italiana, International Nickel Co. and Mond Nickel Co.

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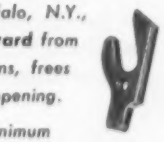

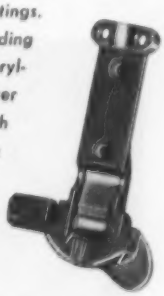

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TECHNICAL REPORT

Melting And Casting Pointers For Better Aluminum Die Castings

By **DONALD L. LaVELLE**, Metallurgist
Federated Metals Div., American Smelting & Refining Co.

THE production of aluminum die castings is, in many respects, of a strictly mechanical nature. It involves the operation of complex hydraulic, pneumatic, and mechanically actuated machinery, the cutting of dies, and the machining or other processing of large quantities of castings. Naturally, the die caster must be skilled in these matters in order to conduct such operation successfully.

But, in concentrating on the mechanics of the casting, the metallurgical or metal handling factors which affect the quality of his product should not be overlooked. A complete discussion of these factors, as follows, contains many melting and casting hints for producing quality aluminum die castings.

1. Furnaces There are two methods of melting and holding aluminum in fuel-fired furnaces for use in die casting. The first method calls for melting and holding the metal in a pot or crucible, from which it is ladled into the machine. In the second method the metal is brought from the solid to liquid condition in one furnace, then transferred to a holding furnace at the die casting machine, where it is kept at constant temperature for ladling into the machine.

The second method, the premelting procedure, has much to commend it. Far more precise temperature control is possible in the holding furnace since all that is necessary is to provide for heat loss by radiation and convection to the surrounding atmosphere. Operator discomfort is considerably lessened, the formation of sludge in the bottom of the pot is minimized and, in general, cleaner metal is produced. In the single-pot method temperature control is at best haphazard. For example, it is apparent that there would be a wide range of temperatures throughout the pot in the case of an operator ladling liquid metal from one side of the pot while a solid ingot of metal projects from the other side. In ad-

1. ELECTRIC HOLDING FURNACE, left, heats metal from within.

2. OIL-FIRED HOLDING FURNACE, below, uses cast iron or refractory crucible.

dition, the metal is used so rapidly that oxides, dross, and dirt do not have an opportunity to separate from the metal and are occasionally ladled into the castings.

In favor of the method which involves melting and holding in the same furnace it can be said that alloy change-over is more rapid and initial cost is obviously less. Nevertheless the pre-melting method is recommended wherever possible. It will be found to be more economical in the long run.

A commonly used furnace in aluminum melting is the reverberatory type, where the metal is melted by heat radiated from the flame, walls and roof of the furnace. It has a high melting capacity at low cost. Sizes range from 400 to 20,000-pound capacity.

Gas-fired or oil-fired pot or crucible furnaces are most common in all but the larger die casting shops. Originally designed to use iron crucibles, they are more and more frequently being equipped with refractory crucibles. It is not possible to state positively whether the iron crucible or the refractory crucible is the better for melting aluminum. Each has its advantages. The outstanding advantage of the iron crucible is its greater resistance to impact; it is far tougher and will take more abuse from the operators.

A serious disadvantage is the fact that molten aluminum will in time dissolve a certain amount of iron and absorb it in the melt. While a controlled minimum percent of iron is permissible and desirable in aluminum die casting alloys, iron content in excess of approximately 1.75 percent is detrimental because it will tend to cause a reduction in mechanical properties, increase shrinkage, reduce machinability, and a definite increase in the possibility of sludge formation.

Periodic cleaning of iron crucibles and subsequent coating with a refractory wash is highly advisable. In fact, it is good practice to treat all iron articles that come in contact with aluminum coated with this refractory wash to prevent the solution of iron in the alloy.

Refractory crucibles will not contaminate the melt and will give long and satisfactory service if elementary precautions are observed and the manufacturer's instructions are followed when installing the crucibles in the furnace setting.

Aluminum for die casting purposes is also melted in electric furnaces. Furnaces utilizing electric resistance windings are infrequently used and their applications are not likely to increase. By far the most popular type of electric furnace is the low-frequency induction type, which heats from within the metal itself and provides several unique advantages. Temperature control is precise, sludge is practically eliminated, working conditions are better because there is a minimum of heat radiated to the surrounding atmosphere and there are no products of combustion. The initial cost of these furnaces is the highest of the types discussed. Their operating cost depends upon the local rate for electrical power.

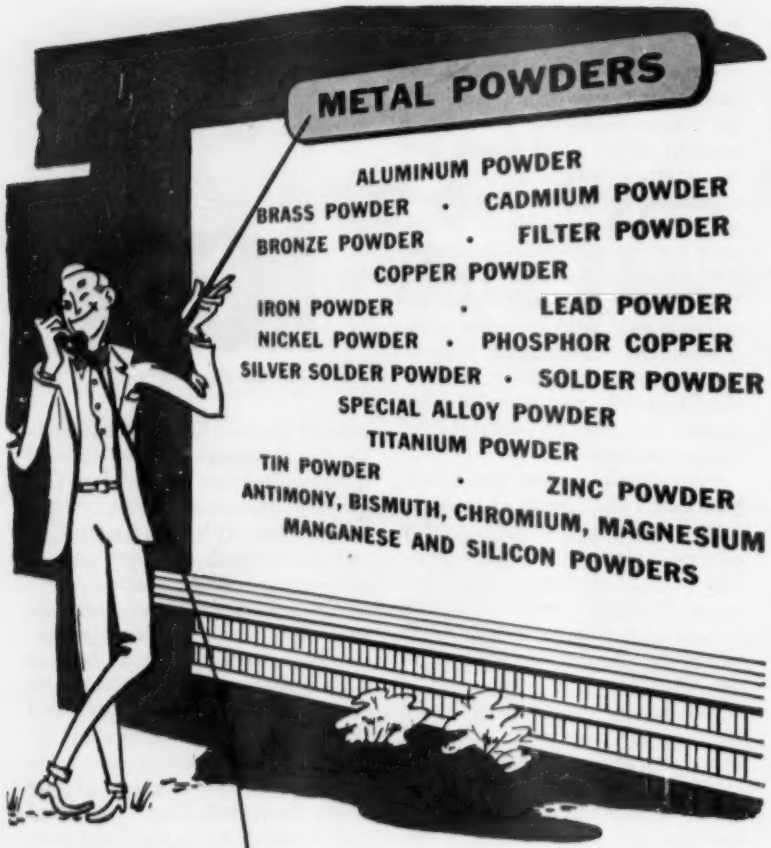
Donald L. LaVelle

2. Fluxing The removal of dross, gas and foreign matter from molten die casting metal, as from other molten metal, is sometimes aided by the use of fluxes. There are

3. GAS-FIRED REVERBERATORY breakdown furnace, below, is tilting type.

4. FUEL-FIRED BREAKDOWN FURNACE, right, holds alloy at constant temperature.

Photos courtesy Dollin Corp.



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basically two kinds of fluxes; solid (or powdered) and gaseous. The solid type usually consists of mixtures of chlorides, fluorides, and metallic salts. The principal use for a solid flux is to assist in the removal of dross from the surface of molten metal. If the dross or oxide is skimmed as it is formed, a large quantity of liquid metal will be removed with it, which is an uneconomical procedure.

Solid fluxes can be mixed or cut into the dross layer so that a reaction will take place between the flux and dross. This will result in the production of a dry, powdery residue which is easily skimmed from the molten metal with minimum loss. Solid (or powdered) fluxes should not ordinarily be stirred down into the molten metal since they do not separate readily and the operation tends to stir in far more dross and non-metallic material than the flux can remove.

Gaseous fluxes consist of dry, oil-pumped nitrogen, or chlorine. The primary purpose of gaseous fluxes is to remove dissolved gas. The dissolved gas, which is principally hydrogen, is a source of pin-hole porosity in sand castings and permanent mold castings. Porosity caused by dissolved gas is practically nonexistent in die castings. This is because the extremely rapid solidification rate causes any dissolved gas which may be present to be released in pin holes so small that they are invisible. At the pouring temperatures commonly used in die casting, aluminum has a low affinity for hydrogen which minimizes pinhole porosity from gas.

For these reasons the die caster need not be concerned with gas porosity and therefore should have no necessity for the use of gaseous fluxes. Other causes for porosity will be discussed later in this article.

Problems Commonly Encounter

1. Sludge The formation of sludge in the bottom of melting and holding pots used in the aluminum die casting industry is one of the most

common and most trouble-some problems encountered by the die caster. The sludge is usually found as a sandy semi-liquid in the bottom of the pot. In severe cases it will become a hard, brittle, crystalline solid.

The sludge consists of aluminum-manganese, aluminum-iron manganese, and aluminum-iron silicon intermetallic compounds. By analysis of many samples it has been found that the sludge will contain up to 10 percent iron and 5 percent manganese, with the remainder corresponding fairly well to the original alloy analysis. It is not an accumulation of silicon as is sometimes supposed.

Most aluminum die casting alloys can be considered to consist of aluminum-silicon or aluminum-copper-silicon eutectic or near-eutectic mixtures which have a relatively low melting-point and which are mixed with the relatively higher-melting intermetallic compounds mentioned above.

Most commonly, sludge is formed when solid metal charged to a melting-pot goes to the bottom and chills that portion of the melt. The solid metal then slowly melts and tends to leave behind the compounds with the higher melting-points. Usually about the time that the compounds would have melted another solid piece of metal is charged which causes the process to be repeated.

Sludge is practically unheard of in the electric, low-frequency induction melting furnaces, and heard of only occasionally in holding furnaces where no solid metal is added and pre-melting is used. It is most prevalent in single-pot melting with iron crucibles, where iron dissolved from the crucible frequently contributes to the difficulty.

Sludge can also be precipitated from a melt which is completely molten if the temperature is lowered and the melt is held quietly for a long period of time. When the temperature drops below the melting-point of the intermetallic compounds, they will form and settle to the bottom. This is relatively infrequent in die casting practice because of the low temperatures and quiet holding necessary.

Using the pre-melting or two-step melting system is the best way to combat sludge formation. It is essential in any melting system to insure that the bottom of the crucible or pot is heated and that the heat is applied evenly to the whole crucible. If the single-pot method of melting must be used, then it is advantageous to add metal in small portions at frequent intervals rather than in large pieces at infrequent intervals.

One other basic cause of sludge formation lies in the fact that most single-pot melting installations are overloaded. More metal is processed than the equipment is designed to handle, with the result that there is not sufficient heat input to melt the alloy completely. It should be emphasized that most sludge is an accumulation of unmelted metal, and not the result of a settling process.

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2. Porosity There are basically two kinds of porosity in die castings, that due to solidification shrinkage and that caused by trapped air or volatilized lubricant.

As in the casting of all aluminum alloys, the change in state from liquid to solid is accompanied by a decrease in volume which is known as shrinkage. If this decrease in volume is not compensated for by adequate feeding, then the shrinkage will appear as porosity within the casting or as a surface depression. This porosity may be finely dispersed or it may be in localized holes of appreciable size. Usually, the heavier the section the larger will be the shrinkage porosity. In thin sections this shrinkage porosity is usually so finely dispersed that it is of small concern.

Trapped air porosity (including, for the purpose of discussion, the gas produced by volatilized lubricants) is by far the more prevalent in die castings. This is because the high velocity injection of metal, with some-

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thing of a spray effect, is conducive to the entrapment of air within the metal stream. The degree of air entrapment and the size and distribution of the resulting porosity is affected by practically every variable in the die casting process.

The occurrence of trapped air porosity can be decreased by modification of gating design so that the metal flow into the mold is less turbulent and is less spray-like. Higher injection pressures tend to result in smaller bubbles because of the greater compression effect. The relation of plunge speed to the amount of trapped air has not been clearly established.

3. Hard Spots During the machining of aluminum alloy die castings it is not uncommon to discover troublesome hard spots. These spots or inclusions are of sufficient hardness to dull the edge of sintered carbide tools or to dull tools of high speed steel. These hard spots are quite commonly believed to be pieces of melting crucible or segregated silicon, whereas, in fact, hard spots from these sources are so infrequently encountered that they need not be further considered.

The hard spots in aluminum die castings consist primarily of aluminum oxide. In those alloys containing magnesium the hard spots are mixtures of aluminum and magnesium oxides. These oxides are dross created during the melting and handling of the metal.

When aluminum is transferred from one vessel to another it is essential to good practice that a minimum of agitation be permitted. The specific gravity of aluminum oxide dross is very close to that of the aluminum alloy and therefore, when dross becomes mixed in with the metal its separation is very slow. Unless the melt is allowed to stand for a considerable time the oxides and dross will remain mixed throughout the metal and will find their way into the castings.

Another prolific source of hard spots in castings is improper ladling technique from the holding or melting crucible. With each ladle the surface layer of metal should be pushed back so that the metal is ladled from a clear spot. The metal should not be stirred or agitated by inserting and withdrawing the ladle many times, before or after making a shot. If it is necessary to pre-heat the ladle it can be merely rested on the top of the molten metal; this preferable to filling and emptying it frequently. The surface of the pot should be kept as clean of dross as possible. A high concentration of oxides in the alloy will reduce its fluidity, resulting in increased rejections for cold shuts and misruns.

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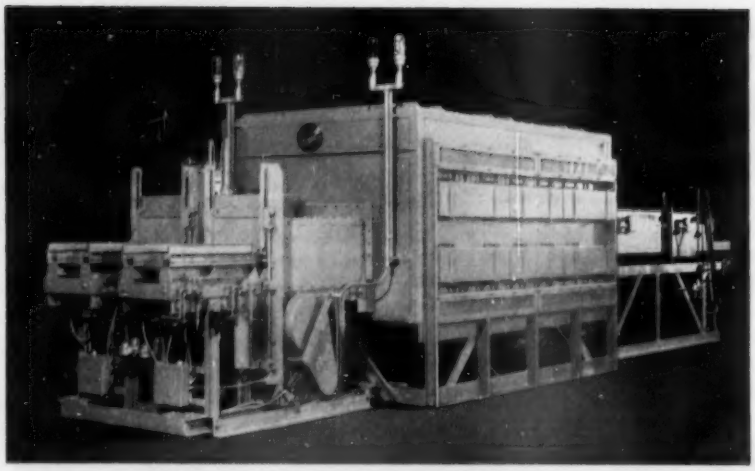

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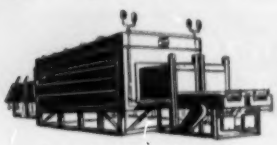
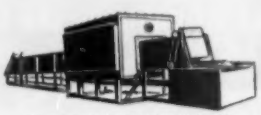


TWIN AND SINGLE MUFFLE PUSHER



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Electric Furnace Corp.
41 RIVER ST., BUFFALO 2, N. Y.

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OPPORTUNITIES

SALES REPRESENTATIVE WANTED: — Largest new process precision casting foundry in the country is shifting sales effort to use manufacturers representative. Most territories open. Prefer young energetic man with engineering background and allied lines. Send all information in first letter including lines carried and volume of sales. Main quality desired is willingness to work. Alcaloy, Inc., 13124 Shaker Square, Cleveland 22, Ohio.

SALES REPRESENTATIVE WANTED for metropolitan New York area. Precision investment casting company (lost wax process) established for ten years. Located in the East. Producer of investment castings in almost all ferrous and non-ferrous alloys. Requires services of a well established representative in the New York metropolitan area who now has related lines such as plaster mold, permanent mold, shell mold, etc. Write giving complete description of background and experience. Write Box No. 11154 PRECISION METAL MOLDING magazine.

FOR SALE—Mount Vernon used hand operated air control die cast machine with melting pot, 18" x 6" bed area. Newton used die cast machine, 11" x 6" bed area. Write Box No. 11254 PRECISION METAL MOLDING magazine.

DIE CASTING, PERMANENT MOLD and allied lines wanted for Ohio by Manufacturers' Representative. Over 10 years experience die casting sales, engineering and management. Can do outstanding job for efficient producers. Write Box No. 11354 PRECISION METAL MOLDING magazine.

WANTED—Small zinc die casting machine in good condition—prefer DCMT, Kipp Caster or Kux Model K. State price and condition. Write Box 11454 PRECISION METAL MOLDING magazine.

DIE CAST ENGINEER—15 years working experience all phases aluminum and zinc die casting wishes to relocate. Write Box 11554 PRECISION METAL MOLDING magazine.

MACHINE DESIGNERS — Die Casting Equipment—As a result of an expansion program of large Midwestern Machine Tool Manufacturer, Engineers, experienced in die casting machine design and development, are needed. Top job available for right man. Write Box 11654 PRECISION METAL MOLDING magazine.

SALES ENGINEERS—Die Casting Equipment—Large established manufacturer of die casting machinery wants sales engineers experienced in die casting process and equipment. Write Box 11754 PRECISION METAL MOLDING magazine.

FOR SALE—One Kux die casting machine, automatic Hydraulic Model BH-30, convertible for zinc or aluminum. Write Box 11854, PRECISION METAL MOLDING magazine.

MacGRATH ELECTED TO DIXON SINTALOY BOARD

At a recent meeting of the board of directors of Dixon Sintaloy, Inc., Stamford, Conn., Kenneth MacGrath was elected a director and member of the executive committee, according to E. M. Cabaniss, president.

Dixon Sintaloy, a subsidiary of the Joseph Dixon Crucible Co., Jersey City, manufactures custom powdered metal parts.

POWDER METALLURGY MAY CUT TITANIUM COST

Titanium may be produced at sharply reduced prices, thanks to a new powder metallurgy process which has successfully passed its laboratory tests.

Dr. Paul Schwarzkopf, president of American Electro Metal Corp., of Yonkers, N. Y., reports that the product derived from titanium scrap may inaugurate a way to drop present prices from $15 per pound to less than $5 per pound.

Dr. Schwarzkopf, who spent several months in Germany, France, Sweden, Italy, and England where he surveyed the entire powder metallurgy industry, observed that European interest in titanium has appreciably increased in recent months.

A year ago most Europeans believed that titanium development was in the infant stage and that the metal was not worth the dollars badly needed in other fields. However, the feeling has changed drastically lately. Today a number of metal or chemical companies in Germany, England, France and Sweden are carrying on intensive research in titanium. Several are already in production.

INTERNATIONAL MEETING SET FOR POWDER METALLURGY

Dr. Paul Schwartzkopf, president of American Electro-Metals Corp., has announced that the second international powder metallurgy congress will be held from June 20 to June 23, 1955 in Reutte, Tyrol, Austria.

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DIE CASTING DIES
FOR ZINC AND ALUMINUM

Complete engineering and tool room facilities for designing and building of die casting dies and plastic molds.
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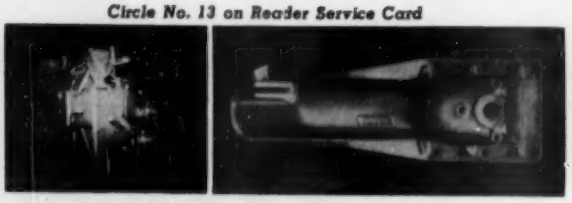
Circle No. 13 on Reader Service Card



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Good design combined with well cast, economically produced aluminum permanent mold castings are the keys to volume sales and bigger profits . . . And our job here at Aluminum Permanent Mold is designing and producing better castings for outstanding manufacturers of American civilian and defense goods. Pictured above are a permanent mold oil pan die and casting and truck trailer leg bracket. For finer castings large or small call in an Aluminum Permanent Mold Engineer.

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PERMANENT MOLD CO.
1054 Front Ave. • Grand Rapids, Michigan

PRECISION FOUNDRY REPLACING MACHINE SHOP AS CENTER OF INDUSTRY STANFORD PROFESSOR SAYS

"The industrial center of gravity is shifting—from the machine shop toward the foundry and other basic processes", Prof. Frank K. Shallenberger of the Stanford Graduate School of Business told industrial research leaders visiting Palo Alto to examine the Shalco shell molding machine which he had designed.

He pointed out that "permanent molding, investment casting, die casting, shell molding, and plastics now achieve precision heretofore possible only by machining".

The ability of foundries to do jobs only machine shops were able to do in the past is placing the foundry industry on the threshold of sudden growth without our economy, he stated.

The shell molding process, which is becoming an accepted method for producing high-quality, low-cost precision castings, he said, has passed the basic research stage. But the increasing economies this process places on the industrial horizon, he pointed out, create a demand for ever-increasing research by industry into ways and means of taking full advantage of today's important changes in foundry techniques.

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ZAMAK (Zinc Base) DIE CASTING ALLOYS

Once you taste the difference between ordinary alloys and H. B. & S. you'll never have an appetite for anything but HENNING products. We strap Zinc Base Die Cast bars on metal pallets of the same alloy to speed handling in your plant. H. B. & S. alloys meet all Government; ASTM and SAE specifications.

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For more information circle No. 37 on the Reader Service Card

Advertiser's Index

NOVEMBER, 1954

A

A.B.C. Die Casting Machine Co. 83
Abbott Ball Co. 75
Accurate Die Casting Co. 78
Acheson Colloids Co. 47
Ajax Electrothermic Corp. 54
Allen-Stevens Corp. 19
Allied Research Products, Inc. 67
Almco Div., Queen Stove Works, Inc. 73
Aluminum Permanent Mold Co. 104
Aluminum Smelters Research Institute 20-21
Aluminum Smelting & Refining Co. ..... Cover 2
American Zinc Sales Co. 12
Apex Smelting Co. ..... Cover 4
Arwood Precision Casting Corp. 84
Aurora Metal Co. 26
Auto-Diesel Piston Ring Co. 80

B

Badger Die Casting Corp. 94
Baldwin-Lima-Hamilton Corp. 4
Bart-Messing Corp. 70
Belmont Smelting & Refining Works, Inc. 80

C

Cannon-Muskegon Corp. 92
Cast-Master, Inc. 1
Celanese Corporation of America 9
Central Die Casting & Mfg. Co., Inc. 88
Central Screw Co. 58
Centrifugal Casting Supply Co. 19
Certified Alloys Co. ..... Cover 2
Chicago White Metal Products Co. 81
Cleveland Automatic Machine Co. 14
H. Cohn & Sons, Inc. 2
Cooper Alloy Foundry Co. 8
Crucible Steel Company of America 25
Cuyahoga Industries 105

D

Damen Tool & Engineering Co. 103
Dollin Corp. 24
Charles Dreifus Co. 90

E

Ekstrand & Tholand, Inc. 82

F

Federal Die Casting Co. 90
Federated Metals Div., American Smelting & Refining Co. 89
Four Plating Co. 74

G

Grand Rapids Brass Co. 31
Gries Reproducer Corp. 101
Groov-Pin Corp. 62

H

Harper Electric Furnace Corp. 102
Henning Bros. & Smith, Inc. 104
Hitchiner Mfg. Co. 95
Hoover Co. ..... Cover 3
Hydraulic Press Mfg. Co. 32-33

I

Injection Molders Supply Co. 84
International Minerals & Metals Corp. 106
International Nickel Co. 23

J

A. Johnson & Co., Inc. 88
Johnson Machine & Press Corp. 83

K

Kaiser Aluminum & Chemical Sales, Inc. 30

L

Lake Erie Engineering Corp. 10-11
Lester-Phoenix, Inc. 22
Lewis Welding & Engineering Corp. 18
Lindberg Engineering Co. 27
Litemetal Diecast, Inc. 85

Continued next page

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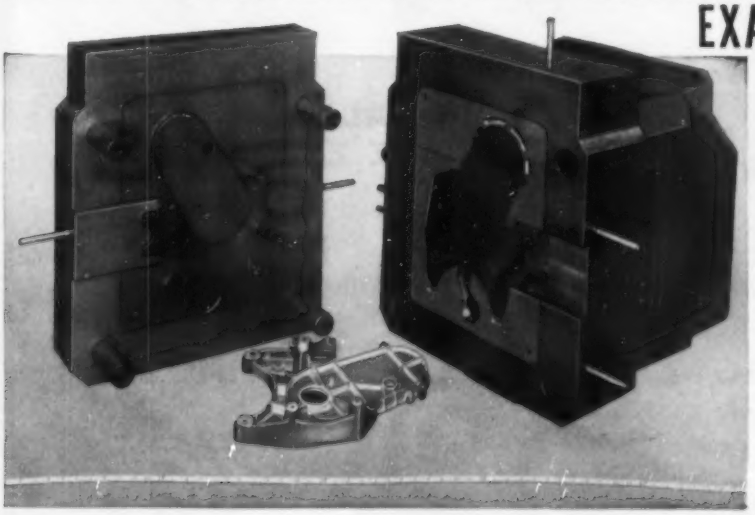

A mere glance will show that adequate equipment was required to make the die pictured at the left. Also, into its design and construction went a know-how growing out of a 21-year background. Cuyahoga places at your command a complete engineering service in die design.

If you will be kind enough to send us your part prints, we will submit our quotation promptly.

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Die castings to specifications . . . that's our specialty. You'll get the job done the way you want it when you specify Racine, and you can be sure your tools and dies are fully protected in our special fireproof storage vaults. We invite your inquiries and will welcome an opportunity to serve your die casting requirements.

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INDEX OF ADVERTISERS continued from page 105

M

Maas & Waldstein Co. 64
Madison-Kipp Corp. 29
Mansfield Brass & Aluminum Corp. .. 73
Mead Specialties Co. 69
Metal Hydrides, Inc. 6
Metals Disintegrating Co. 98
Milwaukee Die Casting Co. 100
Minnesota Mining & Mfg. Co. 63
Monarch Aluminum Mfg. Co. 103
Monsanto Chemical Corp., Organic Chemicals Div. 28
Mt. Vernon Die Casting Corp. 7

N

National Radiator Co. 37
New England Die Casting Co. 38
New Holland Machine Co. 76
Nobur Manufacturing Co. 70

O

Oakite Products, Inc. 69

P

Pangborn Corp. 81
Paragon Die Casting Co. 99
Paramount Die Casting Co. 86
Parker White-Metal Co. 5
Precision Castings Co. 17
Pressure Castings, Inc. 15
Powdercraft Corp. 85

R

Racine Die Casting Co. 106
Reed-Prentice Corp. 52
Roto-Finish, Inc. 66

S

St. Joseph Lead Co. 35
Alexander Saunders & Co. 13
Schultz Die Casting Co. 56
Sonken-Galamba Corp. 77
Spincraft, Inc. 100
Stroh Die Moulded Castings Co. 77
Stroman Furnace & Engineering Co. 34

T

Tamms Industries, Inc. 100
Thompson Products, Inc., Metallurgical Products Div. 36

U

United Chromium, Inc. 72
Universal Die Casting Co. 91

V

Van Dorn Iron Works Co. 87

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Cutting Costs on Cutting Tools

A CASE HISTORY:

Stanley Unishears cut steel, but Stanley Electric Tools, New Britain, Conn., cut costs.

Prize example is the new Unishear No. 214-A, made with five Hoover die castings instead of the sand castings used in the preceding model.

Stanley engineers report that—due wholly to the advantages of die castings—

Material costs have dropped 41%

Direct labor costs have dropped 19%

Machining rejects are fewer because the die castings are uniform in size and shape

Styling is better because the die castings provide smooth surfaces and clean detail

Direct and related savings are expected not only to absorb the die costs within five years, but to return at least 20% per year on the investment

Perhaps Hoover die castings—backed by Hoover's 28 years of experience and its complete engineering, design and production service—can reduce the costs or improve the sales appeal of *your* product. It's certainly worth looking into. Just ask a Hoover sales engineer to call on you. There's no obligation.

HOOVER

SPECIALISTS IN THE FIELD OF DIE CASTINGS

THE HOOVER COMPANY

Die Casting Division, North Canton, Ohio

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Send without obligation for information covering complete specifications and properties of Apex Z-39.

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